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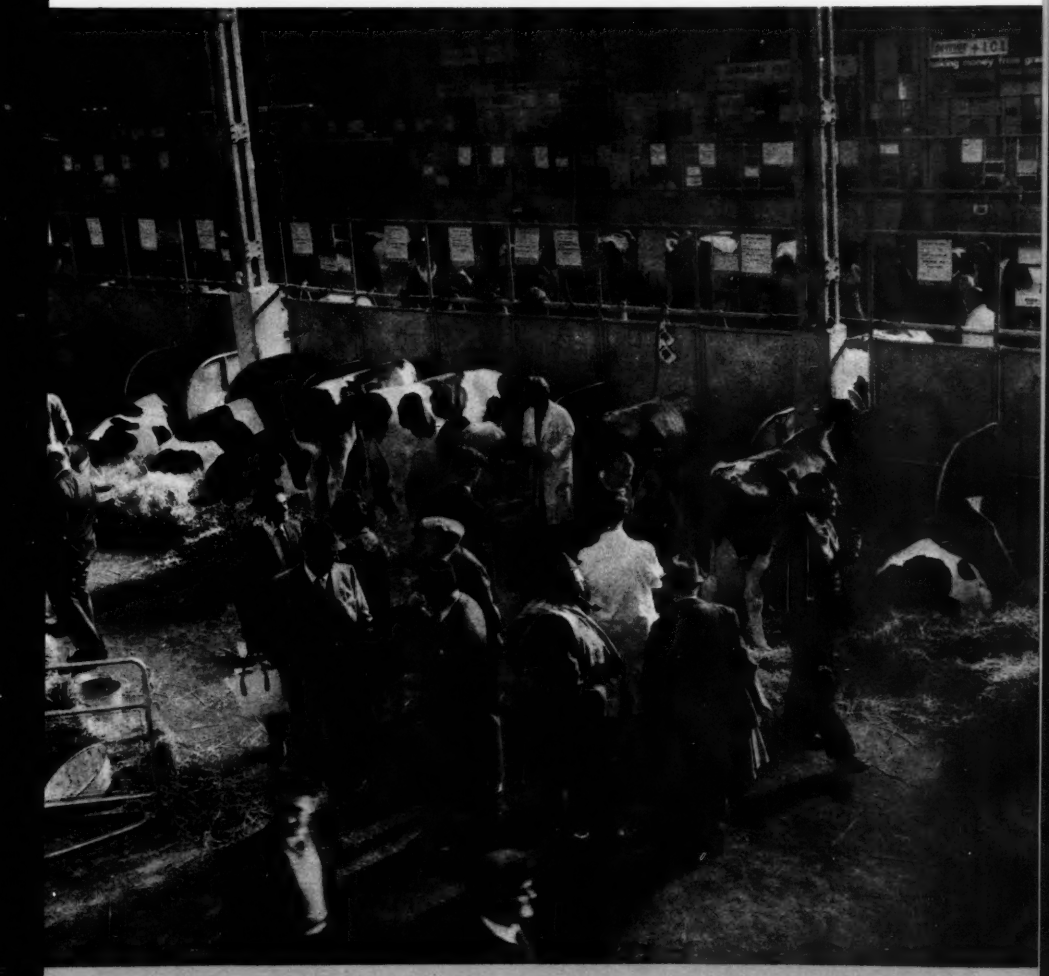

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Agriculture

VOLUME 75 . NUMBER 10 . OCTOBER 1968

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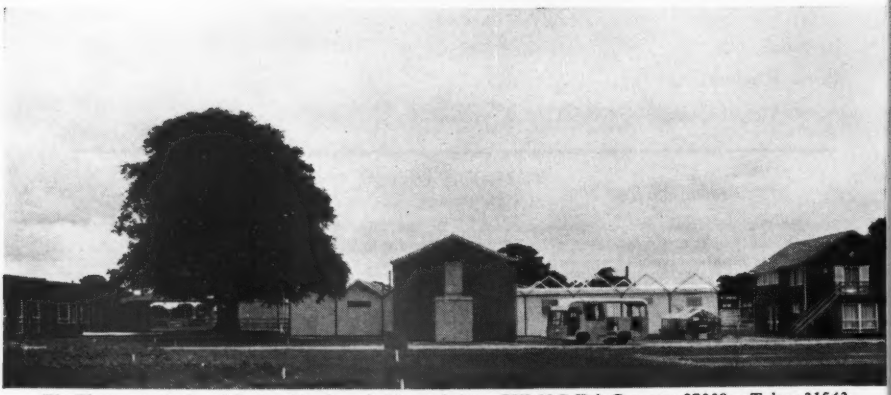
Contents

The Electro-Agricultural Centre for all advisers

This Centre is a permanent part of the National Agricultural Centre at Stoneleigh. It affords a display of fundamental techniques in the use of electricity in agriculture, as well as providing conference and training facilities. In addition, there is a technical and product information library, and adequate provision for demonstrating new equipment. This Centre has been established by the Electricity Council to help all concerned keep up to date with the latest electrical developments in agriculture. It operates in conjunction with the Demonstration Areas of the N.A.C. where electrical methods are widely demonstrated as part of the many new farming techniques.

Advice and information about electric farming methods is freely available from the full-time specialist staff in attendance. Facilities for training courses and conferences are available for use by recognised agricultural organisations. The Centre is designed to meet the needs of all sections of the agricultural industry and to assist farmers in their efforts to increase productivity and cut costs.

For further information contact your County or Regional Office, or Mr.R.G. Scott at the Centre.



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AGRICULTURE OCTOBER 1968

High level cowmanship applied correctly in large dairy herds can ensure that individual attention is given to all animals. The authors here discuss the management aids necessary to obtain a satisfactory return on capital invested in large dairy herds

Large Dairy Herds

W. H. Helme **P. J. James**

DOUBLING, trebling and even quadrupling present cow numbers is a common topic of conversation between dairy farmers. The 200-cow herd is not uncommon and before long the 500-cow unit will not be regarded as unusual. The establishment of a 200-cow dairy herd may absorb £100,000 before it is a going concern: a 500-cow unit can easily need £150,000.

Substantial profits are required if interest on this size of investment is to be met and the capital itself recovered in a foreseeable period of time. This demands above-average performance not only in the use of labour and equipment but, more importantly, in the productive performance of *all* the cows in the herd. To achieve this, improved management aids are required.

One of the major problems is the need to maintain contact with the individual animals in the herd. Improved milking routines with herring-bone parlours are inevitably weakening the association of cowman with the cow. The shorter working week and specialization of labour in dairy units is another contributory factor breaking the link in the chain of observation. Even if these aspects were not vital matters, the physical and mental difficulties of managing large numbers of cows are themselves tremendous barriers to progress.

These aspects of cow management have been recognized as problems for some time and the late Ken Russell, in fact, was often heard to remark that while one man could milk over a 100 cows with modern facilities, it was doubtful if one man could make a proper job of managing more than 50 animals. At a recent conference of the Agricultural Economics Society, Brian Camm expressed a similar view in stating 'The day-to-day management has been neglected by economists and yet, with increased complexity, farming offers a rich reward for the application of new techniques that will ease the burden of decision making.'

Progress to date

Over the years many aids have been devised to assist in the management of a dairy enterprise. Milk-recording in its various forms keeps a check on the performance of the individual animal and forms a basis for day-to-day

management of feeding programmes, and in the longer term provides evidence of the genetic ability of the animal. Recording cards or ledgers note the achievements and problems relative to each animal in the herd.

Breeding charts ranging from simple peg boards to circular management charts assist in keeping track of the breeding cycle which is so vital to success. All these management tools are excellent but become space consuming and complicated with herds of 200 animals or more. In addition, they rely on the cowman's powers of observation which are increasingly strained as the number of cows is increased. Moreover, they suffer from the disadvantage that they have to be kept up to date by the cowman, and with increasing specialization of labour it becomes progressively more difficult for this to be carried out satisfactorily.

Fresh approach

In the past, management records have tended to be a statement of the historical facts. In recent years, however, there has been a noticeable change in the reasons for recording; many people now accept that it is possible to predict future events and that a reasonable short-term forecast can be made of future developments. With the acceptance of this possibility, recording becomes a means of establishing whether the facts of the situation have turned out as predicted. If they have not, it is possible to determine why the differences have occurred and whether anything can be done to make future predictions more accurate. The calculations involved in making forward predictions are usually best done in an office and not by the cowman; after all, the cowman is paid to look after cows and is not employed as a mathematician. Thus, it is suggested that, in the future, the information centre for the dairy unit should be the farm office and not the milking parlour. In this situation the role of the office will be to tell the herd manager which animals will need looking at. In other words, they will identify and draw his notice to the matters which require his expert attention. In this way he can restrict his efforts to the few animals which really need investigation.

If this is the dairy farm of the future, how is such a system likely to work?

The future

The first problem of management in large dairy herds, that of cow identification, is rapidly being overcome. The batching up of groups of similar animals into units of 40–60 head has been practised for a long time. For the identification of the individual animal, identity discs are now reasonably reliable and will doubtless form the basis of identification for the next few years. Other methods of identification are also being developed. One of these is electronic equipment in which each cow has its own individual signalling device. Considerable thought has also been given to the possibility of implanting this device in the brisket, which is similar to the ear-tagging or tattooing methods now in use. Other methods under examination involve the use of television cameras to identify colour brands and the detection of infra-red radiations from areas of skin from which the hair has been removed.

These developments in identification methods will considerably ease the present problems of large herd management and will enable recording to become automated. In the meantime, the philosophy of this approach can be adopted even if it has to be allied to hand recording methods.

The first pre-requisite of this system of cow recording is that all the data for the individual cow should be contained in one record. In dairy management many factors can be responsible for changes in milk yield, the main measure of the cow's productive capacity. For instance, a fall-off in yield is frequently due to inadequate feeding but it can also be caused by a disease problem or changes in the breeding cycle. A recording system where only one of these factors is related to milk yield is incomplete, because it is necessary to consider all the facts in order to determine the reasons for an apparently poor performance.

When all the facts are contained in one record, there is an opportunity to operate an early warning system as the stages in the breeding cycle are approached. By bringing all the interacting factors together, office routine is simplified and the attention of the herd manager can be drawn to those animals which need his attention at a particular time. It also provides the means for greater accuracy in predicting the future performance of the cow. The use of lactation curves like those used in the N.A.A.S. Dairy Management Scheme have proved to be a practical possibility for predicting the milk yield of the dairy herd. It is not difficult to take this method of yield prediction one stage further and apply it to the individual cow. This method not only indicates the total amount of milk likely to materialize in the future but also shows the duration and the rate of fall-off of milk production once the peak of lactation has been reached. By making the prediction for individual animals, modifications to the 'normal' lactation curve can be included as part of the prediction process.

A prediction of milk yield two or three weeks ahead is, of course, an essential first step to scientific feeding of a dairy herd and should be incorporated in the record. Anticipation of the contribution that bulky feeds will make towards production is an essential part of the rationing system, because this enables a calculation of concentrate usage to be made. From the same basic record, an estimate for the rationing of the individual cow is, therefore, possible with little extra effort.

With this information and the breeding cycle drawn together on one sheet, recording them assumes its real role. Progress throughout the year can be checked against the predictions made and the real reasons for changes in production can more easily be determined. By removing the recording from the parlour, high level cowmanship can be used efficiently and applied at the correct time to the important matters of cow management. Hence the cowman's skill is directed to the points where it is required. The number of cows selected for attention on each day can be identified by health and breeding requirements, supplemented by those cows whose yield has fallen short of the required level by a predetermined amount.

Thus high level cowmanship is not wasted but can be applied at the correct points and there is no reason why the same individual cow attention cannot be given in the large herd as in the small. In this manner the farmer can ensure that as the herd gets larger its performance gets better because the needs of individual cows are not overlooked. He is then more likely to be able to earn a satisfactory return on the large amounts of capital which are required in establishing a large dairy unit.

This article has been contributed by **W. H. Helme, B.Sc. (Agric.), N.D.A., N.D.D.,** and **P. J. James, N.D.A.,** who are Farm Management Advisers with the National Agricultural Advisory Service in the South-Eastern Region.

Covered feed area

A 500—cow Dairy Unit in Sussex

N. K. Green

In the summer of 1967 the author carried out a brief survey of large dairy herds in south-east England, and by far the most impressive one was that being built up by Messrs. Brian Langmead Ltd., at Home Farm, Selsey, Sussex, where at that time the Church Norton Herd of British Friesians numbered nearly 300 cows in milk.

The intention is to build this herd up to 500 cows in milk this year and it is thought the planning underlying this project would be of interest to readers.

In 1966 Mr. Brian Langmead toured the U.S.A. to gain first-hand knowledge of large-scale milk production there, and he came across an enterprise near Seattle on the Pacific coast which greatly impressed him. Moreover, the climate there was very similar to that of the Selsey peninsula in Sussex where he was already farming. So he decided to put into practice at Selsey the broad concept of what he had seen on this Seattle farm, introducing his own modifications to improve upon it as he went along.

By the summer of 1967 the project was well under way on a total acreage of 610, made up of 220 grass, 210 wheat, 160 maize, 8 rough grazing and 12 miscellaneous crops.

The policy is to go for high yield, the target being 1,500 gallons of milk per cow per year by 1970. The figure was an average of 1,137 gallons in 1967, taking cows and heifers together.

The cows are fed three times daily on bulk foods and three times daily on concentrates, the concentrates being fed in the milking parlour. In winter, mainly maize silage and purchased barley (steamed and rolled) are fed, but some hay is also used.

In summer as much as possible of the grass was grazed, but now the policy is to keep the cows off the grass and to cut and carry it all to them. It was found that driving the cows to and from even nearby pastures was too time-consuming, added to which trampling and fouling by so many cows did not give the grass a chance to yield its full potential.

One of the more interesting aspects of this enterprise is the layout of the buildings in which it is carried on. It started with what might be referred to as the usual arrangement of modern yard-and-parlour, with clamp silo, erected close to an old group of traditional farm buildings. But the ever-increasing herd is no longer housed or fed in the covered yard. Instead, the cows are provided with rows of kennels, in which to lie, and with rows of covered mangers in which to feed.

In 1966 kennels were provided in fourteen rows for a total of 222 cows. In 1967 a further 264 kennels were added, and in 1968 it is planned to have added yet 264 more, bringing the total up to 750.

This year there will be 500 cows and probably 750 next year and there is nothing to stop the herd increasing to 1,000 or more after that.

In the beginning the kennels were home-made by farm staff, but so many of them were needed, not only for this farm but also for sale to other farms, that a local company of agricultural engineers proceeded to manufacture them for an ever-expanding market.

The kennels are constructed of timber framework, all pressure-treated with preservative. The end walls are clad with exterior grade plywood and the roof and rear with galvanized corrugated steel sheeting. The cost works out at something in the region of only about £17 per cow, for the kennels.

In the beginning the cows were fed at rows of mangers in the open, flanked by concrete roadways which gave access to self-unloading trailers. But experience soon showed that it was unsatisfactory for the mangers to be exposed to rain, so a special type of covered feeding area has been devised which is now used on this farm and is made to order for sale to other farms. Originally these cow kennels and covered feeding areas were not grant-aided under the Farm Improvement Scheme, but now they are approved for that purpose.

In these days, when the herring-bone type of milking parlour is all the rage, it is surprising to note that it is not favoured for the milking of this very large herd. Instead there is a 12-stall 6-unit-abreast type of parlour discharging into a 3,000 gallon bulk tank. The reason for this is the paramount importance of unhurried milking of each high-yielding cow three times a day, and it is considered the herring-bone type is not suitable under these circumstances.

Incidentally, milking is done by five men on a shift system, milking eight hours per shift. A sixth man does all the tractor work of filling the mangers

Cow kennels with covered area behind

and disposing of the slurry, and there are two men who look after the cows as individuals, apart from feeding and milking.

With the manager, the total labour force is nine men, giving an average of about 50 cows per man, which tends to show that in the long run it is a mistake to try to manage with too few men. This is underlined by the fact that all herd replacements are bred and reared on other farms.

With a herd of this magnitude, disposal of slurry might be expected to be a problem, but it is not as there is plenty of arable land available on which to spread. Originally the method was to collect the slurry in an underground tank, but now it is considered better to keep it as far as possible above ground as solid material which can be handled by a foreloader. Ploughed in under maize and wheat it is being found to have great manurial value.

Reviewing this enterprise as a whole it would seem that it is achieving success by the application of principles that are usually regarded as fine in theory but very difficult to work in practice, namely, close attention to cows as individuals, use of maize instead of grass and treating slurry as valuable fertilizer instead of as sewage.

This article has been contributed by **N. K. Green, B.Sc., A.R.I.C.S.. F.L.A.S.,** Land Commissioner, Ministry of Agriculture, Fisheries and Food, South Eastern Regional Headquarters, Reading, Berks.

The Royal International Dairy Show will be held at Olympia, London, on the 19th, 21st, 22nd and 23rd of October, 1968.

Wall Finishes in Milking Premises

D. G. Pepperell. *Agricultural Land Service, Bristol*

To comply with the Milk and Dairies Regulations (Regulation 13(*c*)) 1959, walls must be impervious, and capable of being readily cleaned. Compliance with the Regulations will be more easily achieved if they are without crevices, ledges or cills which can harbour dust.

This is asking a lot of any wall surface treatment, but it is not sufficient to consider only the treatment which would be most likely to withstand the constant wear and tear. It is equally important to take account of the base to which the surface material is to be applied, and the conditions prevailing at the time this is done.

The requirements of the Regulations effectively preclude the use of soft absorbent materials, or those having a backing of such material which might be affected by the constant wetting it should receive. It is essential, therefore, that all concerned in complying with the Regulations, be he an architect, builder or other adviser, should be aware of the problem and the need for choosing the correct materials, the correct time and method of applying them. They should also be aware of the consequences of neglecting to take the advice of manufacturers in the application of the material selected.

Materials

Fortunately, the materials in common use for the walls themselves are few. Walls are generally constructed in stone, brick or concrete block, with or without cement render, but, occasionally, sheet materials are used in non-traditional type buildings. There are, however, very many suitable finishes in use, and the development of new ideas and new products will extend the range needing to be considered before a final selection is made of the one most likely to meet the particular requirements. Finishes can be divided into two main groups:

(*a*) those which are applied in the fluid or semi-fluid state, such as paints and plastic compounds, and

(*b*) those which are applied in a rigid state, i.e., tiles.

Those in the first group are the most popular and more generally used, primarily because they are the cheapest and easiest to apply, often by semi-skilled labour. Although initial costs may be lower than with the second group, it should not be overlooked that maintenance costs are likely to be higher because the material has to be applied thinly and, consequently, is

apt to wear away faster. Nevertheless, if properly applied it should give several years of satisfactory service.

Although by no means an exhaustive list, the following are some of the materials likely to be encountered or suitable for use in milking premises.

Chlorinated rubber paints. These have a very stable and non-reactive base compound. They are resistant to weak acids, alkaline-solutions, brine or salt and have good corrosion inhibiting qualities. These paints can be applied by brush or spray, and two or three coats are usually recommended on a dry, grease-free surface.

The drying time is about four hours and the surface can be recoated in 16 hours. One gallon of the paint will cover approximately 40–50 sq. yards.

Epoxide resin paints. There are two air drying types, both of which have great chemical and solvent resistance, and can be applied by brush or spray. Two coats give good cover.

(*a*) Epoxy ester or decorative paint which may be applied over existing paint systems as a conventional paint, but it is desirable to seek advice from the makers before doing so. Some 'one can' polyurethane paints fall into this group.

(*b*) Epicote or cold cure paint (two pack). This does not require oxygen but dries by the addition of a catalyst which becomes part of a tough skin resistant to alkalis, acids and solvents. Thus it forms an entirely new type of surface coating, that is one that combines the chemical resistance of 'baked films' with the convenience of air dried coatings.

Temperature affects the hardening process considerably. At a temperature of 40°F (4·4°C) it is practically nil, so the coating cannot be applied in cold buildings. With a normal room temperature of 65°F (18·3°C) it can be handled or recoated after 12 hours, but the full strength is not taken up until after seven days at the same temperature. The covering capacity of this type is approximately 35–40 sq. yards per gallon.

Gloss oil paints. With these pigments and base are ground in refined linseed oil, and adjusted to the required working qualities with dryers and thinners. These paints should not, however, be applied direct to alkaline surfaces such as cement or asbestos without suitable priming, otherwise the oil will be attacked, and the paint film will become brittle and porous.

If this type of paint is selected it is desirable, in addition to the priming coat, to apply at least two coats of the paint itself, the covering capacity of a gallon of which should be reckoned as approximately 90–100 sq. yards.

Alkyd gloss paints. The alkyd resin paints have largely superseded the oil based paints, being a more stable and durable finish. They have considerable resistance to acids, and general wear. Plaster, cement rendering or brickwork surfaces must be dry and free from efflorescence before the application of a suitable primer.

The undercoat dries overnight and the gloss finish in two–four hours. The covering capacity of one gallon on a non-absorbant surface is 65–75 sq. yards.

Multi-colour paints. A specialist application is essential and the finish, which is usually a sprayed application in one coat, is very hard wearing and can be used to conceal uneven surfaces. The appearance on completion is that of a base colour with flecks of a different colour.

Emulsion paints. These are water based and very easy to use. They provide a tough thin film through which moisture in the wall may evaporate without causing serious damage. Several coats are needed to give good coverage, but one coat can be used in the early stages of decoration while the wall is drying out. It is probably the only type of paint that can be used successfully on a damp wall although, of course, a dry wall is always preferable. The first coat should be thinned with water to suit the porosity of the surface, and it may be used to take up the suction for some other systems such as a gloss paint finish.

Drying time is very short, usually only 1–2 hours, and a further coat may be applied immediately. Average covering capacity per gallon is 70–100 sq. yards but it could be less on very porous surfaces.

Plastic coatings. These are a new formulation of polymers which are cured with a catalyst. They are applied as a free flowing liquid by means of brush, roller or spray, and on drying form a flexible plastic sheet of exceptionally high strength and adhesion to most common surfaces. They are claimed to be resistant to abrasion, water penetration, oils, lactic and common acids, alkalis, detergents and chemical solutions. They can be applied so as to give a continuous finish over walls, ceiling and floor if required. Repeated applications may be used to build up a heavy deposit, and the effect is very similar to a P.V.C. film.

The surfaces to which the coatings are applied must be free from dust and dry (flame dried if necessary). Drying time 4–6 hours at an average temperature of 55–65°F (12·8–18·3°C), but second coating can be started in about one–two hours. Coverage is about 55 sq. yards per gallon. Special cleaners and solvents are required for brushes, etc., and manufacturers' instructions should be followed.

Plastic compounds. These are formulated from fillers and pigments compounded with thermoplastic resins. This produces a washable, coloured, matt-textured finish and is suitable for application on concrete, sand and cement, plaster, plasterboard, asbestos, etc. The finished surface is applied about $\frac{1}{16}$ in. thick in one application, usually being stippled with a brush and, when dry, is flexible and crack resistant. The surface is not smooth, but this is not a disadvantage when high pressure hoses are used for cleaning down. Covering capacity is approximately 1–1$\frac{1}{4}$ lb per sq. yard.

Integral repellants. These are in liquid or powder form and are added to the cement rendering as it is mixed. The cement coating becomes water and oilproof and chemical and fungus resistant. Renderings should not generally exceed $\frac{3}{4}$ in. thickness applied in two coats, with four days between each. This will allow initial shrinkage to take place.

Silicone water repellants. Although these are not usually found in internal work, there are situations where they may be useful. The silicones are suspended in solvents which penetrate the pores of stonework, brickwork

or concrete, and upon evaporation, the surface resists water penetration satisfactorily for several years. After about six years, however, the efficacy tails off.

Terrazzo. This is a mixture of marble chippings and white Portland cement in the ratio of 3 : 2 which provides a very hardwearing, decorative finish. After the cement is set the surface is ground down to a smooth finish with a carborundum wheel. This material has no flexibility and will crack irregularly wherever there is movement in the building structure. This can be a considerable disadvantage as water will penetrate the cracks and may thus cause hidden damage to the building, added to which such cracks could harbour dust and germs. Specialist application is essential.

Terrazzo tiles. The mixture for these is similar to that used for '*in situ*' terrazzo, but is made up in the factory in conveniently sized tiles. These are about $\frac{3}{4}$ in. thick and are bedded on cement and sand. Any cracks which may occur will tend to follow the line of joints. In other words, although the cracks may still be there they will probably not be so obvious.

Faience. A tile material of burnt clay usually with a glazed finish and 1–1$\frac{1}{4}$ in. thick, according to the size of tile. This material is very resistant to all acid and chemical attack, but is rather expensive to use and needs specialist skill in fixing.

Glazed tiles. These are a biscuit of white clay with a glazed surface fired on and are in very common use domestically. They are bedded with special bonding compound, but care should be taken in selecting a suitable bedding material. Any material used for bedding tiles which does not set off, or becomes pliable again if wetted, should be avoided.

Plastic tiles. A cheaper form of glazed tile to which the foregoing note on bedding is applicable.

Polyester glass reinforced. The possibilities of this material should not be overlooked. It can be made to adhere to many materials, taking on the general shape of these, and could easily transform the interior of an existing room of dissimilar materials with a continuous plastic lining.

Wallboards. The increasing use of 'prefabricated' or factory-made buildings on our farms, has opened up a market for various types of lining materials. Among these are a number of wood-fibre based building and insulating boards faced with laminated or sprayed plastic finishes. These boards, which are generally 8 × 4 ft in size, and of varying thicknesses, can be provided ready-fixed to the building wall and roof panels or supplied for erection as a lining to an existing building. As can be imagined, a highly impervious surface finish is thus possible, provided that joints in the material are carefully sealed.

Defects

Most defects occur from defective backings, bad preparation, insufficient drying out, or in the case of tiles, etc., defective bedding. Dampness and

efflorescence soon break down the majority of paint films and can affect other materials. Paint films may crack where and when the backing shrinks and, on ageing, may become brittle or lose other of their qualities.

Tiles may 'blow' or loose their key to the backing and bulge out due to expansion of the adhesive or shrinkage of backing. Frost may also cause the bedding or tile to fail.

Occasionally, the wrong type of material is used. One case the author investigated had tiles fixed with a hygroscopic material which absorbed so much moisture that it expanded, thus forcing the tiles away from the wall. The condition was, of course, aggravated by the constant washing down and, to a certain extent, by moisture penetration through the external wall which was comparatively thin, i.e., 6-in. solid concrete blocks, but it does emphasize the need for proper selection of material.

Preparation

Adequate protection and efficient decoration cannot be expected from paint unless the basic surface is in a proper condition to receive it. Preparation is the most important part of applying the finish to any material. Apart from cleaning down, and removing loose particles and grease, the surface must be dry. If walls in existing buildings are damp, the cause of dampness must first be ascertained and remedied, and the surface allowed to dry out thoroughly before painting is attempted.

Similarly, new cement and plaster surfaces should be left to dry out thoroughly and mature whenever possible, and this may mean several weeks, or even months, in the case of Portland cement. Efflorescence due to salts crystallizing on the surface may often develop during the drying-out period, and should be removed by repeated brushing, rather than by washing, until it no longer forms.

The weather can have an adverse effect on painting. Applications during foggy or frosty weather should be avoided. The most favourable period is late summer rather than the spring, as the comparative dryness and warmth facilitate penetration of the paint into the surface and increase the protective power.

If walls are painted directly they are erected they will be damp because of the quantity of water used in the construction. On the other hand, if, for example, the walls of a dairy are left undecorated before being put into use, it is unlikely that the walls will ever be painted successfully because of the conditions and the constant washing down. Even though the right materials may be chosen, the manufacturers' instructions closely followed, and a good craftsman is employed, a lasting surface treatment is unlikely to be obtained if the material is applied to a damp or defective backing. The crux of the problem is thus how to organize the work so as to leave the new building long enough to dry out. If this cannot be done, the alternative is to consider a more expensive finish which may overcome the difficulty.

Maintaining High Fertility

C. M. Gould

THE calving index of the national herd is calculated to be 395 days, the same as it has been, within a day or two, for many years. Now that the business revolution in agriculture is in full spate, the importance of a better calving index is becoming more and more obvious as farmers take steps to reduce their losses due to inefficient usage of land, food and labour. Budgeting for an improvement in the calving index from 395 to 375 days is not a very difficult task for a combined operation between the farmer, his stockman and his veterinary surgeon, and results in a realistic, and certainly not over generous estimate of an increase in the gross margin per year of about £3 10*s*. to £4 per cow, including veterinary fees.

The improvement will not be reflected in the balance sheet overnight; indeed, the full amount will often not be seen for at least two or three years because the cattle have to calve in again before there is an effect on milk production. So the earliest any improvement can be seen is in 10 months and it is unlikely to be completed until at least 24 months have passed. If the herd calving index has been far greater than 395 days, the final results should be even better but how quickly they can be attained, will depend on the nature of the problem and certain factors appertaining to the individual farm which have to be taken into consideration.

As already said, a combined operation between the farmer, his stockman and his veterinary surgeon produces the best results. There is more to it than just vaccinating against brucellosis or feeding a mineral mix. If that were all that was wrong, the 395-day calving index would be inexcusable. Vaccination and advice on nutrition and the breeding programme are involved but at least half the battle is to ensure that the basic records are kept, which will *quickly* show that there is trouble if anything goes wrong, so that it can be rectified promptly. This is called monitoring production and the breeding programme.

Monitoring

Various breeding record systems have been publicized recently both by the A.I. Centres and the farming press. All veterinary surgeons welcome this improvement in the records kept. But few farmers realize as yet that the system most suitable for one farm may not be the best for the next. The records which should be kept depend on the size of the herd, the system of husbandry, whether or not the cowman can make use of office

help, the breeding policy the farmer has decided to adopt, whether or not a seasonal calving pattern is wanted, what calving interval is required, whether A.I. and/or natural service is to be used, and what problems are most likely to arise.

If good records are to be kept, the identity of each cow must be known, otherwise more harm than good may be done. Freeze branding could solve the problem by permitting identification at a distance. It is generally found that if the system right for the particular farm is installed and if the cowman can be persuaded to keep the system going for the first three months or so of a breeding season, he will continue to keep records, because he knows why they are wanted and how they are used. Once the system has been in operation for a year or two a healthy rivalry develops in being the first to spot the early signs of trouble, and, all to the good, the dice are loaded in favour of the stockman if he knows what he is about. In other words, both the farmer and the stockman must learn how to recognize from the earliest signs that an infertility problem may be developing, since the veterinary surgeon is not on the farm every day.

The monitoring systems which have been publicized are designed to show promptly that a herd infertility problem has arisen. A slightly more sophisticated system will show even more promptly not only that there is trouble but where the trouble is likely to be. Such a system is well within the scope of an efficient farm office and so, over the next few years, it is likely to supersede the present methods. Veterinary interest will certainly be concentrated on such systems as these for detecting earlier signs of the start of a period of infertility. Lessons will be learned not only during the breeding season but also from a review at the end.

The calving index—three factors

A bad calving index can be man-made, or due to cow infertility or to bull infertility—or to a combination of two or all three of these factors.

Management and stockmanship. In most herds the calving index is very closely related to the length of time service is delayed after calving, and increases in the index may unwittingly be the result of managerial decisions, for example, through a decision to change from a spring-calving policy by delaying service, or deciding not to serve the cows until it is so late in lactation that a good calving index is impossible.

Management or the stockman may also decide not to contact the A.I. Centre until the cow is no longer in season, in the belief that fertility may be higher then, without realizing that the proportion of cows served too late will also increase and will probably more than counteract any benefits gained by the others.

Some stockmen do not know which cattle are bulling; others forget to contact the A.I. Centre in time. And, of course, statistics indicate that cows are inseminated only half as often on Sundays as on other days of the week! The practice adopted is not necessarily to be condemned, provided the farmer consciously makes the decision for one reason or other and realizes its implications.

A recent survey in the U.S.A. indicated that in that country man-made infertility was the main cause of between half and two-thirds of all the herd infertility problems investigated. On the evidence available for this country half would certainly not be unreasonable. In a recent Veterinary Clinical

Observation Unit Pilot Survey which covered herds which did not have a serious breeding problem, over a quarter of the cattle were first served more than 85 days after calving, the last day one can reasonably expect a cow to have a calving interval of 365 days or less. Even in above average fertility herds it is not surprising or unusual to find that man-made infertility accounts for the addition of 10 days to the herd calving index.

The infertile cow. At least equal in importance is cow infertility. It is often forgotten that nowadays three-quarters of all the herds in the country use A.I. Herd infertility here is mainly man-made or cow-made because A.I. centres keep a close watch on semen fertility. When the records of a farm are examined it is usually found that over a certain range of milk yield more and more of the cattle become difficult to get in calf. The range varies from farm to farm—and on the limited data available this ties in well with the standard of nutrition around the time of service. This backs up some Australian work which indicates that cows losing weight, 'milking off their backs', are temporarily more difficult to get in calf. In this country this is most likely to occur as a herd problem when the silage or hay quality is poor—following a wet spring. Not only does the digestibility and energy content of the roughage fall but also the mineral content. Veterinary research now has the difficult job of discovering how much of the problem is due to major factors in the food, lack of energy, 'milking off the back', etc., and how much to minor factors, trace elements, etc., some of which, for instance, lack of cobalt, may be acting indirectly by depressing appetite. In the meantime, the best advice would appear to be that the farmer should make sure that the cattle are fed enough food, both in quantity and in quality, until he is sure they are in calf, i.e.—enough energy, enough protein and enough minerals, etc.

This does not mean that they should be fed too much. The Australian work showed that the infertile cattle had low blood glucose levels. This occurs if they have fatty livers, if they are being underfed for production—or if they have acetonaemia (ketosis), which can also occur if they are receiving too much protein in the ration. In the South of England, and perhaps elsewhere, there is a saying that you will cure ketosis if you get the cow in calf. But as these cows also have a reputation for being very difficult to get in calf, the converse is, in fact, true—cure the ketosis and she will conceive.

How then can cow fertility be monitored?

1. Adequate breeding records must be kept to give calving dates as well as service dates and, if possible, all bulling dates, whether or not served and a note of any pertinent clinical condition. The farmer should consult his veterinary surgeon as to when and at what time routine measures should be taken to spot and correct particular types of infertility during the immediate post calving period and later. The breeding records should be designed to highlight the early signs of a herd infertility problem.

2. Many veterinary surgeons will want to know how the actual milk yield compares with what could reasonably be expected. This information—especially what happens following a change of roughage—becomes more valuable each year adequate records are kept and whenever there is a marked fall in production. He may want to know how the monthly S.N.F.s compare with previous years: a marked fall indicates underfeeding and an increased risk of infertility.

3. He may want to know about food intake—both of concentrates and roughage—or at least variations in intake. By these records he attempts to relate food intake to production. Weight changes could well eliminate the need for some of the records, but weighing dairy cattle is not an acceptable routine yet to most farmers.

4. He may want records kept of cases of disease, in particular metabolic disease—ketosis, cows refusing cake, milk fever and hypomagnesaemia, etc. These all indicate that the nutritional standards may have changed and indicate the possibility that fertility is being depressed.

A review at the end of each breeding season is most useful. Feeding kale can lead to infertility in some instances; we want to know more about the cause and the early signs. Cattle turned out in the spring often fail to conceive during the first two to three weeks out. We want to know more about herds where this does not happen as a pointer to the cause in those where it does.

The infertile bull. To spot bull infertility quickly a second set of records should be kept—the cow served, which service, the bull used, and an indication of the result of service, in order of date of service—on a monthly or quarterly planner, in a diary or just in a list.

The bulls should be used in such a way during the main breeding season that any trouble will show up reasonably quickly and that spread of any infection will be limited. How this is to be done will depend on individual farm circumstances. In addition, certain measures can be taken to prevent the introduction and spread of a disease by a bull, especially when a new bull is brought into a herd or before one is put with a fresh batch of heifers.

Maintaining high fertility consists of establishing certain routines to prevent the entry and spread of disease, and the introduction of a good record system to monitor production, fertility, feed intake and certain diseases. How quickly infertility will be recognized varies according to the cause, the record system devised, and the standard of stockmanship and management. The record system should aim to highlight the early signs of the most common causes of infertility likely on the farm as soon as they become significant.

During the last few years much has been learned about infertility. A combined operation to maintain high fertility, between farmer, stockman and veterinary surgeon is becoming much more common nowadays.

This article has been written by **Colin M. Gould, M.A., B.Sc., M.R.C.V.S.,** a veterinary surgeon in general practice.

Previous articles on Disease Prevention

The following articles on preventive medicine have appeared in previous issues of *Agriculture:*

Changes in Veterinary Practice	May 1967
Preventive Medicine on the Farm	June 1967
Control of Stomach Worms in Calves	June 1967
Bronchitis in Calves	July 1967
The Thin Sow Syndrome	November 1967
Prevention and Control of Poultry Diseases	November 1967 December 1967
Mastitis Control	March 1968
Clostridial Diseases	March 1968
Prevention of Enteric Diseases in Calves	May 1968

This is an account by a Divisional Veterinary Officer of the foot-and-mouth outbreaks in the West Midlands area during November and December, 1967. It includes the extent of the organization necessary to master the disease, such as the deployment of the Ministry staff and the co-ordination of the help given by so many willing individuals and other bodies

Foot-and-Mouth Disease (2)

Part I of this article appeared in the September issue of 'Agriculture'

J. Edwardson

The control centre

The Civil Defence Authorities placed the underground accommodation at Hindlip Hall, three miles from Worcester, at our disposal as a control centre. The several caverns were immediately underneath the headquarters of the West Mercia Police Headquarters. The layout of the organization was made initially on 16th November, and this remained without modification until the centre closed on 28th December. Each cell was marked for particular amenities, facilities and functions. Each of these sections may be briefly described.

First came the police room where officers detached completely from normal duties acted as liaison between local authority officers and veterinary personnel. The room was fitted with maps which were plotted with outbreaks not only in Worcestershire, but all surrounding counties—infected areas—two-mile circles—and parish boundaries. Here they dealt with general inquiries, licensing, routes, the problems of their colleagues in the county and farmer visitors. There were three telephones in the room and when each day was over the police information room at ground level took over the night watch.

The second room housed the typing and duplicating equipment, and there the shorthand-typists completed a variety of reports, forms and documents.

The third room was the map room where 6 in. maps displayed the infected places in red, dangerous contact farms by blue lines, and details of all livestock within two miles of every outbreak. These were completed from Veterinary Officers' maps. The ready location of all danger spots, the resolution of movement problems, location of slaughterhouses and allocation of work were greatly facilitated here. It was the only room for interview, report writing or recording.

Room No. 4 might be named operations room. There the R.V.O., D.R.V.O., D.V.O. and a V.O. with executive and clerical officers received the majority of telephone calls and visitors. There also, with maps, correspondence and information, decisions were taken and directions issued.

In room No. 5 all the case files and reports were handled. A card index system was invaluable in enabling proper work allocation, completion of reports, checking completed work and serving a variety of purposes. Even miscellaneous correspondence went through this system, which is a must for all foot-and-mouth disease centres.

Room No. 6 was in the hands of the Technical Assistants who were responsible for all stores. The variety of materials necessary for the work was infinite, shepherd's crooks, thermometers, protective clothing, torches, guns and ammunition being a selection of the items.

Room No. 7 was the boiler room, which although not intended for other use, proved vital for drying newly-disinfected equipment.

Room No. 8 was the Veterinary Officer's room, conference room and stand-by room.

Room No. 9 was occupied by A.L.S., N.A.A.S. and Field Officers. All accommodation and catering problems received attention.

Room No. 10 housed the telephone exchange. As many as three operators were fully engaged for many long hours, but to their credit there were no waiting lists for calls.

The contractors had a mobile office above ground and an admirable heavy equipment and machinery depot two miles from the centre. They maintained hourly liaison not only with the Worcester centre but also for those in Warwickshire and Herefordshire.

It was also necessary to provide accommodation for fumigation of equipment and cleansing and disinfection of cars. Catering for men in the field and for those indoors was organized very efficiently by the W.V.S. and the police canteen. Even indoors many did not leave their desks throughout each day. The artificial light occasionally failed and with the high staffing, ventilation and heat presented problems.

But there were other welfare problems. For example, hair cuts were organized on the job. Even floor sweepers were included in the organization. But through it all the police officers from headquarters did their utmost to aid the smooth running of the centre. Their colleagues in the field were augmented in numbers to meet their many foot-and-mouth disease duties.

The communications

Basic communications were well organized and operative. The centre was geared to receive and transmit information constantly throughout the 24 hours of each day. Veterinary personnel maintained direct communication with farmers and essential services and organizations. The Chief Constable kept personal daily contact with the centre, and the police officers maintaining liaison dealt with problems in the infected areas, movement problems, licensing and the individual problems of their colleagues in the field. As local authority officers, they also held regular conferences with veterinary personnel and issued teleprint advice to police officers in the county for information and uniformity purposes. The Local Authority, through its central and other offices, was also in constant communication with the centre.

Requests for early imposition of restrictions were circulated expeditiously. Communications with the N.F.U. were also of a high order. Officials visited the centre daily or made daily contact and were thus apprised of the situation and able to circulate authoritative information to their members and also resolve problems by direct contact without delay. Individual members and groups of members visited the centre where they saw the up-to-date positions and the working of the centre and were also able to discuss other problems with veterinary personnel.

Radio, television and Press communications were regular, constant and full. Recorded and direct radio and television communications were a daily

feature. Similarly, local and national Press communications were well organized and efficient. Visitors to the centre included the Minister of Agriculture, Fisheries and Food on 11th December, who toured the centre and later met representatives of all the organizations involved in Worcestershire, Herefordshire and Warwickshire: he also held a Press conference. One M.P. also visited the centre and he, too, took a deep interest in every activity. The account about visitors would be incomplete if reference were not made to the visits and important investigations of the epidemiologists, historians and other scientists—veterinary and medical.

The outside world

This account of foot-and-mouth disease in Worcestershire covers 32 outbreaks, the last one being on 6th December. At the same time, in Shropshire, Cheshire, Staffordshire and several other counties 1,578 outbreaks had been confirmed and were being dealt with by 24 other centres each with their own particular problems in connection with the type of country and type of stock but all with the universal aim that the disease was to be mastered as quickly and as effectively as possible.

Calf Wastage and Husbandry in Britain, 1962/63

(From H.M.S.O. price 12*s.* 6*d.* (by post 13*s.*))

THIS is the latest in the series of Reports on Animal Disease Surveys by the Ministry's Animal Health Division in collaboration with the Department of Statistics, Rothamsted Experimental Station.

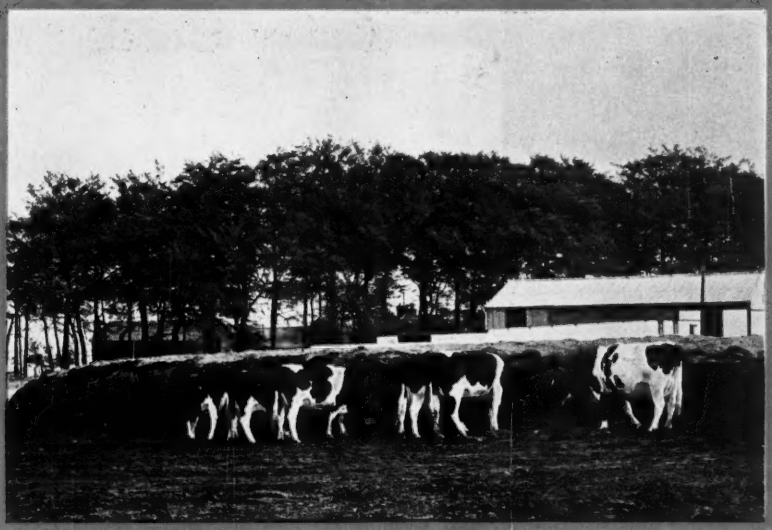
Before practical plans had been considered, the intention was to ascertain the causes of losses among calves and their incidence. At that time losses were believed to be very considerable. It was evident, however, that the distances from many farms to Veterinary Investigation Centres would make it impracticable to obtain carcasses of dead calves in a state suitable for detailed investigation. The survey was, therefore, designed to concentrate on reliable estimates of losses and on the circumstances in which they occurred, to see whether any particular form or forms of husbandry were associated.

A random sample was selected from the herds of Britain in which calves were born and/or reared; in all, 1,567 owners (63·4 per cent) gave full co-operation and individual records were obtained for 32,373 home-bred and 7,800 purchased calves.

The Report shows that the overall loss was a good deal lower than many people thought. The majority of losses occurred during the first month of life of home-bred calves. Relative to age of calf, losses were generally greater in purchased than in home-bred animals. The Report, which runs to some fifty pages including 54 tables, contains, besides a detailed study of calf mortality, information on the methods of calf husbandry, the distribution of breeds, the pattern of calf-housing in Britain, and on the traffic in calves.

Although the survey was carried out in 1962/63, a number of subsequent local surveys support the view that the findings are still valid; indeed, the main survey showed that the incidence of calf wastage in Britain had changed little since that reported by Lovell and Hill in 1940.

Housing and Management of the Dairy Herd



This feature, on the subject of the management of the multiple dairy herd and the development of kennels for housing dairy cows, contains articles by:

★ **P. A. Naylor, N.D.A., Dip. Agric. (Leeds),** who is County Agricultural Adviser for the National Agricultural Advisory Service in Hampshire. He has always taken a special interest in organisation of dairy farming.

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Multiple Dairy Herds

P. A. Naylor

MULTIPLE herds have been with us for a long time. This form of dairy farming organization started in the mid-1920s when it was innovated by the late Arthur Hosier. By 1927 he had five herds, totalling 320 cows with yields of 700 gallons plus, and was winning praise for cleanliness and economic production. His success was repeated by others, notably Douglas Seligman and Rex Paterson in Hampshire—and in post-war years Hugh Prettejohn in Pembroke and Richard Ecroyd in Hereford. This form of dairy farming has now been tested and proven on total herd sizes of well over 2,000 cows.

How it works

The first essential feature is the breakdown of the herd into sub-herds or units of a size that can be handled by one man. This one-man unit of responsibility is the key to the whole organization and no matter how many sub-herds or units the management has to oversee, the line of communication and placing of responsibility is clear. There can be no 'buck-passing' or dispute. Efficiency factors are easily recorded and direct comparisons of performance of the units are possible.

The second essential is that each sub-herd is allotted an area of land for its exclusive use; this is calculated according to a chosen norm for stocking rate in relation to nitrogen input. This area of land usually provides grazing and conservation, but on ley/arable farms the conservation can be separate. The creation of 'sub-farm' units for each herd follows the same line of reasoning as for the one-man unit of responsibility. Skilfully done it ensures an equal share of resources and opportunities for each herd, maintains the competition and eases the task of management in that the comparisons made are known to be fair.

These two essentials being satisfied a wide choice of equipment and number of cows per man is available. Because each man is independent of his fellows it is usual to provide simple, low first cost type individual milking

parlours. About 70 cows per man with a four or six-stall abreast parlour or fixed bail is quite common, but the ten-stall herring-bone and up to 120 cows per man are under trial, especially where support staff from an arable unit are available.

Simple housing is provided in some cases but in the south on suitable soils outwintering is the rule. Bulk food, usually silage, is either self-fed direct from the clamp or offered in rationed quantities behind feed fences or in bunks. Concentrated foods are fed in the parlour. Ideally the 'housing' and feeding are kept simple enough for the herdsman to perform his own chores on and around them and, in fact, at the 70–80 cow level he is generally responsible for all tasks, including help with the conservation process.

Both Ayrshire and Friesian are currently chosen as the breeds for the organization; in the past Guernseys and Jerseys have been equally successful. Service is usually by A.I. Autumn calving has emerged as the predominant calving pattern as the cows are usually in better condition at this time after a summer on grass and calve with a higher initial yield. Also, conditions for calving out of doors are better and the effect of summer drought in the south and east is minimized. Autumn calving leaves the herdsman better able to help with silage-making and the men themselves prefer it for all these advantages.

Management control

Variations in the pattern of management control exist. With some organizations the herdsmen are virtually independent farmers within the common policy laid down, subject only to suggestion from management made according to the information coming forward. In other cases they are subjected to a very high degree of control to the extent of tight rationing of bulk foods based on analysis, concentrates according to yield and to independent checks on cow health and fertility. As a general rule incentive bonuses of various kinds are offered to herdsmen for yield, milk/feed relationships, etc., and quite often the system of employment is a contract. As the number of sub-herds increase, a layer of middle-management in the nature of a farm manager is usually installed for each eight to twelve herds. Some clusters of 'herds' may be remote from the nerve centre and thus have to function independently for day-to-day decisions but not, of course, for policy or supply.

The vital element in the management control of a multiple dairy herd organization is the daily recording and weekly summarizing of the essential facts in each of the sub-herds for scrutiny and decision making by management. This record contains, as a minimum, a daily total of milk produced, foods fed, fertilizers used, calvings, service and stock movements and may be supplemented by other health records, such as yield recordings and weather data.

Multiple herds have been described as an organization in terms of many sub-herds but its possibilities apply equally to the smaller number. There are some good examples of two, three or four herds being organized on this basis. There are, of course, many others where multiple herds exist without the principles of one-man units of responsibility or equality of resources being applied but to be truly a multiple herd organization and to enjoy its full benefits the principles must be applied.

What is in it for management?

The first advantage to management in the multiple herd organization is the opportunity of low investment in simple buildings and equipment. Cows and land take precedence. This can lead to a very useful return on tenants' capital which, when calculated conventionally, is usually better than 20 per cent. This in turn is ideal for re-investment for growth in a situation where land can be made available over a period of years, e.g., buying in of poorly equipped and under exploited grass farms in the west, fragmentation being no barrier so long as 100 acres or so can be gathered in one place, or more likely, perhaps, in a situation where a switch from low output cereal growing is necessary.

Secondly, management stress can be minimized, as it is left free to concentrate on the real business of control, i.e., of examination of the data coming in and making decisions upon it, and of making money work. The efficiency of the multiple herd organization is directly proportional to the managerial effort and control put in. It is significant that one of the country's leading chain-stores operates by exactly the same method.

Finally, this organization is socially strong, the herdsmen are proud of their independence and ability, a good community spirit exists amongst them and despite the seemingly rugged conditions the turnover of herdsmen is unusually low.

A practical example

The internationally known example of the multiple herd organization is that of Rex Paterson Farms Ltd. Largely based in Hampshire but with some farms in South Wales they control a total of 3,400 cows and 44 sub-herds. The typical sub-herd is now about 75 cows on 100 acres of grassland, receiving 250–300 units N and paddock grazed. Previously the sub-herds were about 65 cows allocated 120 acres at 50 units N. The land surplus to the original requirements is used for young stock or grows barley, but as cottages become available it can be formed into further sub-herd units.

Each sub-herd has an open-backed abreast parlour and concrete collecting area for milking. This open-backed parlour is probably the most flexible and easy to operate of all parlours and is capable of throughputs equal to the equivalent herring-bone, except that 'performance' in this respect is not important. It is a feature of the organization that the herdsman has as much time as he cares to take for the milking operation; in practice, about 10 cows milked per unit/hour is achieved.

The cows are outwintered and are self-fed silage from an outdoor clamp. The silage is made with flail harvesters and each herdsman builds his own clamp from material dumped for him. Autumn calving is the rule and supplementary feed is restricted to 8–10 cwt per cow of a mineralized barley cube; discretion is allowed as to when it can be fed but the most effective time is early in the lactation. The labour, apart from the herdsman, is one tractor driver/milker for each pair of sub-herds who cuts and hauls grass for silage to the two units he serves, spreads the fertilizer for them, carts slurry and looks after a few other tasks, including any arable work there may be. The amount of relief milking he undertakes varies according to the herdsmen and is arranged directly with them as they need time off. A farm manager looks after each group of 8–12 herds.

The economy of this organization in handling materials is fairly obvious. Only short hauls and simple machinery are required for mowing the grass for silage, the cow grazes all her summer needs and only small inputs of supplements are involved. Fertilizers are handled in bulk and are few in variety. No bedding straw is moved, most winter dung being dropped on to the layback paddock, which reduces the amount of slurry to be handled. The milk is collected in cans directly from the individual parlours.

From the description of the organization of multiple units it is apparent that the success or otherwise of the whole depends upon the sum total of the sub-units and, therefore, on the individual skill of the herdsman. As one would expect, a wide range of skill is, in fact, revealed. Mr. Rex Paterson is on record as saying that this skill can account for differences in yield performance of 200 gallons on either side of an anticipated norm. The average yields per sub-herd of his farms can vary in any year from 500 to 900 gallons per cow from comparable resources. The minimum yield expectation is 620 gallons per cow or 40,000 gallons per herd and 400 gallons per acre. In the year ending 30th September, 1967, 31 sub-herds out of 42 bettered this standard and only two were markedly below it. In management terms the target 'margin over concentrate' figure is £95 per cow; 28 out of 42 sub-herds reached or bettered this, and again only two were markedly below, while the top six herds averaged £106 per cow with a concentrate input of only £11 per cow. In 'per acre' terms £60–£80 per acre clear of feed costs is the normal range.

Incentive payments go some way towards achieving a constant striving for better performance, but the effort made depends on the individual, as delegation or responsibility for the day-to-day management of the sub-herd is substantial and the influence of management is suggestion as much as instruction.

Contrary to popular belief the turnover of herdsmen is low; the current average length of service of all Mr. Paterson's herdsmen is over 12 years and some have had more than 30 years' service. Most of them are from a rural background but this is not essential.

Each herdsman completes a weekly information sheet which goes through the Farm Manager to the farm office at Hatch Warren where an office staff of five receives the records from the 44 sub-herds and, by arrangement, 25 others from herds under similar management, bringing 6,000 cows under surveillance. The essential facts are summarized and passed back to managers and herdsmen as a guide. A milk graph is kept for each herd, which not only allows comparison of actual with predicted performance, but also shows up discrepancies immediately and alerts the appropriate level of management. The farm office not only leaves the managers free to manage but also provides them with an up-to-date commentary on the effectiveness of their actions.

Hatch Warren is a treasure house of information stretching back for many years. Events that would not be of moment in one herd or even three or four become significant if repeated in many herds. In this way the connection between potash application and the incidence of hypomagnasaemia was picked up some time before scientific proof established the connection and, in the meantime, the Paterson farms had cut down their usage of potash and had almost eliminated 'staggers'.

Mr. Paterson has arrived at this balance of men and equipment in relation to cow numbers; stocking rate in relation to fertilizer use; cow performance

in relation to supplementary foods; and has consolidated his version of the multiple herd organization which, taken as a whole, shows him a very substantial return on the capital involved. Others operating the same organization may choose different relationships and achieve equally good results, provided that they adhere to the essential principles.

What of the future?

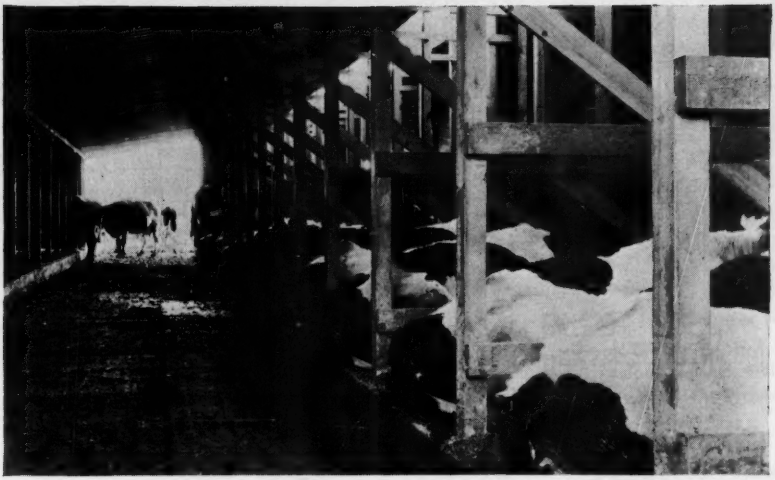
Expansion is planned in a great many dairy herds and the spur is the need for greater output to leave a worthwhile income. Two factors make this expansion possible. The first is the greatly improved potential of grass and the second is the labour-saving possibilities of the new range of cow handling equipment. There is a wide choice of alternatives, all of which can be expected to work reasonably well if the expansion is proceeding only to rationalizing around one or two men milking. Beyond this situation, when we reach the very large herds of say 200 cows or more, the alternative forms of organization become fewer and some of them more speculative.

Many of the theories put forward for the organization of the large herds of the future involve heavy capitalization in equipment and buildings. Inevitably, the standards of cow performance and overall efficiency to cover costs, service the capital and leave a worthwhile profit have to be set at a very high level. The assumption is made that managers and herdsmen capable of attaining these standards can be found and will be attracted by good facilities and pay.

In all this speculation, now approaching trial in some cases, the proven possibilities of the multiple herd organization have, possibly, been largely passed over. Perhaps it is right that we should experiment with other methods of organizing large herds, but for the majority of herd owners bent on expansion the chief items of interest are, or should be, the return on the capital invested in the change-over and the ease with which management can control the new organization.

The reason for the apparent neglect of the multiple herd organization in current planning may be due to the image it conjures up in our minds of cows 'roughing it', of outdoor silage heaps in winter weather, shack-like buildings, low yields and high wastage. The facts are that in the South-East where this form of organization was pioneered the soils and climate allow outwintering or rudimentary housing with only occasional periods of discomfort. Yields are not affected by cold weather once the cows are acclimatized and wastage rates on herds practising rearing of their own replacements are below 25 per cent. In other parts of the country various levels of sophistication of equipment have been imposed on the organization without detriment to its essential features. Provided that the lesson of the smallest capital input to gain your technical and managerial ends is learned, the design of buildings, the feeding system and the technical performance of the cow can be of your choosing. The multiple herd organization offers the opportunity of low capital demand for equipment but the overwhelming factor in its favour must be the ease of management that it brings in terms of a very large number of cows.

Multiple herds are the only adequately proven system of large herd organization. Others may eventually prove superior in technical terms but at this point in time it is difficult to see that they can equal or better the financial performance. As technical innovations come along there is just as much opportunity for using them in a multiple herd organization as in any other. As these facts are realized I expect to see a resurgence of interest in the multiple herd organization, particularly because of the advantages it offers to anyone starting a large herd, but probably even more to those who hope to expand step by step from an existing smaller herd.



A four-row 'sleep type' timber kennel

WHAT PRICE

Cow Kennels

J. B. Young

NOT since the advent of the milking parlour has any development in dairy buildings caught the imagination of the farming community in the South-West as has 'kennels'. From a small beginning, when they took the form of temporary structures erected on the side of a Dutch barn or concrete apron and open to the elements at the rear, kennels have developed into quite sophisticated buildings produced in a variety of shapes and forms to suit virtually all management requirements or herd size.

What are kennels?

There is often confusion in people's minds between kennels and cubicles. This is understandable for as a method of housing they are basically the same; indeed, one could perhaps best describe kennels as a 'package deal cubicle building'. However, the accepted variation between the two is that in kennels the stall divisions, either wholly or partly, comprise the support structure of the building, whereas in cubicles the stalls are normally a separate entity placed in the building after erection which normally has a minimum eaves height of 8 feet.

Fig.1

Fig.2

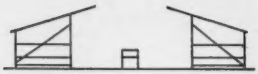


Fig.3

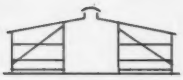


Fig.4

Fig.5

Fig.6

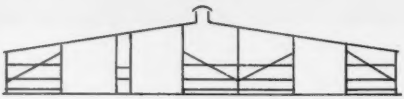


Fig.7

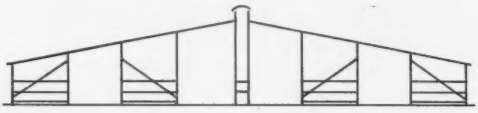


Fig.8

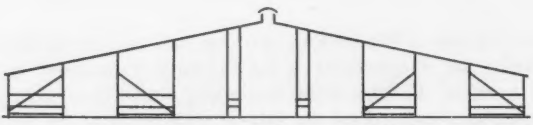


Fig.9

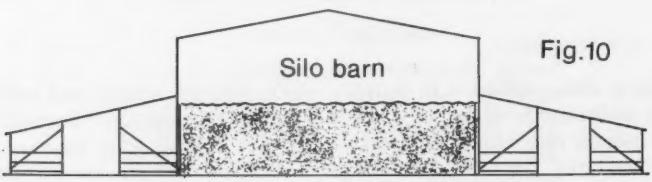


Fig.10

Background

Initially, kennels were evolved to provide more or less temporary housing, surplus to the existing available housing, for a few cows but the idea was quickly developed. It was seen that here was a potential low-cost structure to which package deal and mass production principles could be applied, thus achieving for cow housing what had been done in the case of poultry, pigs and grain storage. It was also felt that they would prove of great benefit to the 'do it yourself' enthusiast.

Development

Ignoring the prototypes, the first basic kennel unit (Fig. 1) was the single row type and a logical progression was to place two of these facing outwards to form the two-row type (Fig. 2) and then, by widening the gap between the two rows and inserting a manger, the two-row with central feeder (Fig. 3) was produced. The combination of Figs. 2 and 3 gave an effective four-row block with integral manger allowing 2 ft per cow feed face. This was and is the cheapest kennel unit but it has some disadvantages on very exposed sites.

From Fig. 4 onwards, we have the more sophisticated kennels which were designed as complete two- and four-row units with and without feed areas. The designs shown at Figs. 2, 4 and 5 are the 'sleep type' and would normally be used in conjunction with self-feed silage or an independent feed area either open or covered. Figs. 3, 6, 7, 8 and 9 relate to designs with integral feed areas—the 'feed and sleep type'—Fig. 9 having an independent feeding passage. Fig. 10 shows a modified two-row type in the form of a lean-to.

The line drawings on p. 484 merely illustrate basic layouts and not design, as clearly there are variations between manufacturers, e.g., in some cases the supports extending above the mangers are eliminated by using trusses, which allows unimpeded access to the mangers.

General design features

The first manufactured kennels were single-row structures with a cantilevered roof for extra protection at the rear and Fig. 1 shows a section of this particular unit. It is not proposed to go into details of structural design in this article as there are so many variations depending on materials used and manufacturers' inclinations. However, the following overall measurements are in the light of experience the most practical for general application:

Kennel widths	4 ft centres
„ length	7 ft from head wall to rear of heel plate
Dung passage	8 ft
Distance behind mangers (feed and sleep type)	9–10 ft
Eaves height	6 ft min
Roof pitch	10–11 deg
Height of bottom rail above bed level	18 in.

A head or brisket rail must be adjustable so as to cope with various breeds, but as a basis to work from, 18 in. from the kennel front is normal.

So far as overall floor area per cow is concerned, with the 'feed and sleep' types there is adequate space; 60 sq. ft per cow is the minimum of any of the types shown and this is normally increased in the larger units due to the need for cross walks—thus the cows can be confined to the building. With the 'sleep type' the cows have a basic 44 sq. ft each and must therefore have an additional loafing area. However, as this type usually combines with self-feed silage or an independent feed area there is no problem.

Blocks of kennels can comprise any number of rows and be of any length. However, where a feed area is incorporated the feed face restricts this area; thus a four-row type is appropriate in this instance. So far as maximum length is concerned, to facilitate cleaning 100–120 ft (25–30 cows per row) is proving to be about right. With long rows, cross-walks for cow circulation should be provided, which means eliminating a few of the individual kennels.

The bulk of experience so far is in timber kennels and it is perhaps valid to point out where they have failed structurally. There are two main points of failure, the lower side rail and the heel posts which, initially, were 4 in. × 1½ in. and 3 in. × 3 in. respectively. The failures were caused by two factors: (1) use of knotty timber in these critical positions and (2) use of nails. To overcome these problems (*a*) there should be careful selection of timber, (*b*) the lower rail should be increased to 4 in. × 2 in. the heel post to 4 in. × 3 in. and (*c*) bolts (preferably with timber connectors) used to unite the various members and make for a much more stable structure overall.

Materials—framework

Timber construction

The majority of kennels erected in the past were constructed of timber. This medium is likely to remain popular, firstly, because it is cheaper in

initial cost and, secondly, it is perhaps more attractive to the 'do it yourself' enthusiast. Now that some of the earlier failures in structural members are being overcome, maintenance costs will be reduced and timber kennels should have a life well in excess of ten years. On the basis of present design timber kennels are clearly specialized buildings with limited alternative uses.

Steel construction

Many kennels are now being manufactured in steel (mainly rectangular hollow sections) and although to a variable degree higher in initial cost they have a greater flexibility of design and a potentially longer life due to the inherently tougher material used. Steel kennels are produced so that much of the internal divisions can be removed leaving vertical members only at 8–12 ft centres. This would allow alternative use to a far greater extent than timber kennels should a change in farming policy take place.

Combination of steel and timber

With this type of kennel the aim is to get the best of both worlds. By using steel for those structural members most likely to suffer damage a stronger unit is produced and the total cost is only marginally higher than the timber kennels.

Materials—roof and side

Roof cladding

Normally this is either trough section aluminium, asbestos or high tensile galvanized steel sheeting. The trough section allows a simpler roof design having the ability to span greater distances but while the alternatives, may be cheaper, savings are largely cancelled by the need for a more complicated support structure. The type of roof depends largely on the supplier.

Side cladding

Many materials have been tried—butt jointed boarding, with joints sealed with battens, exterior grade plywood, oil tempered hardboard, galvanized and aluminium sheeting. All of these are satisfactory in general and, as with roof cladding, the type used depends to a large extent on the manufacturer from whom one buys the kennels. Plywood and hardboard are, however, only used to a limited extent.

Bedding

Choice of bedding is to a certain extent dictated by the method of dung disposal, i.e., whether it is treated as a pure slurry or a semi-solid. A bed of straw or wood shavings with a sand or clinker base has been found best in practice, but clearly there are disadvantages if slurry has to be pumped at a later stage. However, this type of bed is extensively used and fits well into an FYM system of slurry disposal. Alternative types of bed are: sawdust, dried yard dung, railway sleepers, rammed chalk, etc. However, the main thing to remember is that the floor should be stable. Floors of rammed chalk inadequately consolidated, or hardcore and gravel tend to break up and lumps come to the surface. This is uncomfortable for the cows, can cause injury and lead to refusal on the cows' part to enter the kennel.

Environment

It has been noted that given the choice between kennels and alternative methods of housing, cows prefer the former. Certainly, they lie snugly in kennels and provided a 4–6 in. gap is left under the eaves, plus a ventilated ridge in the multiple row building, there are no ventilation problems. As in all types of stock building, draughts must be avoided and one end of a kennel block should have sheeted gates or doors at the ends of dung or feed passages to avoid the tunnel effect. Kennels have been used in exposed situations and subjected to extremes of climates with no detrimental effect on the stock. It has been suggested that cows moving from these warm conditions to outside feed areas or self-feed silage might suffer due to sudden temperature change. However, there is no evidence to suggest that this is so on the many farms where these systems are used. Passages should be cleaned down daily and provided this is done the cows keep extremely clean, which is no mean advantage.

Capital costs

Much has been said about kennels being the ultimate in low-cost dairy housing but it is not the object of this article to compare the kennel with the alternative methods of housing. However, it is perhaps fair to point out that with the larger dairy units of 80–100 cows, the saving can be as little as £5–£10 per cow and one must weigh the additional cost resulting from a longer life and more lasting general-purpose structure against a lower priced specialized building with a relatively short life. Clearly, the greatest advantages as regards cost come when kennels are used for the small and medium range herds, particularly when providing supplementary housing on an existing set-up.

Examples of costs for some of the types illustrated on the basis of supply and erection on prepared foundations are:

Fig. 1 Single row	£14–18 per cow	
Figs. 2, 3, 4 and 6 Double row	£18–22 „	with centre manger add £6
Figs. 5, 7 and 8 Four row	£20–30 „	with feed area add £5
Fig. 9 Four row with separate feed passage	£45 per cow	
Fig. 10 Lean-to type	£20 „	plus silo

For the 'do it yourself' erector there is a saving of approximately 30*s*. per cow on the above figures.

The foregoing are approximate costs and to these must be added another variable figure, i.e., that for the foundations and concrete passage which (assuming a reasonably level site) is £5 per cow on average. On a difficult site up to £2 per cow can readily be added in levelling.

When it comes to ancillary works, i.e., concreting for feed, loafing, and access areas plus drainage (including dung disposal), fencing, light, water and electricity, there is a wide variation in costs depending on whether one is spartan or deluxe. At worst, one can double the above costs on a per cow basis but a 50–75 per cent plus would be a fair assessment. If the kennel unit includes an integral feed area then clearly the cost of external work is reduced and *vice versa*.

Complete kennel units including parlour, collection and dispersal, and slurry disposal, but excluding fodder storage, as a rough guide can work out at approximately £80 per cow if done without frills.

Annual costs

The theory has been advanced on several occasions that 'if you change to kennels you will recover the capital cost in two or so years by saving in straw'. Analyses of annual costs of the various alternatives show that there is very little difference when taking all factors into account; except perhaps with smaller herds in areas with high priced litter, but this is a subject in itself. (An article dealing with the economics of kennel and loose housing will appear in a later issue.)

Dung disposal

This without doubt is by far the most important consideration when planning kennels or indeed any system involving slurry, but more often than not disposal methods are the last factor to be taken into account. The usual reaction is to leave this problem to be sorted out after the unit is more or less complete, which is nothing short of madness.

If planning kennels (or indeed any slurry system) the first question to ask is 'Can the large quantities of slurry produced be disposed of?' If, after investigation, the answer is 'No'—forget them. However, should they prove practical then the following main methods can be considered:

1. Slurry scraped up over a ramp direct into a spreader.
2. Slurry scraped into pit or above ground level storage tanks and then spread on land with tanker or through irrigation system.
3. Slurry scraped into a large dungstead or depression, allowed to drain and dry out in summer and then handled by conventional equipment.
4. Allow slurry to mix with straw and push to a dungstead and handle as FYM.

Currently the method used to the greatest extent is to treat the slurry as a semi-solid (method (4)). By bedding the cows in straw, an ideal bed, enough straw is removed by the cows into the passage to stabilize the slurry and allow it to be pushed to a dungstead and heaped for subsequent disposal as FYM. Straw usage is no more than 3 cwt per cow per winter. However, this system is not always practical.

Future developments

Kennels have been designed for the housing of beef cattle and for single-suckling cows plus calves and both show some promise. At least one farmer keeps the whole of his dairy herd and followers from young calves onwards under this system by tailoring the kennel size to the class of stock housed, and this is proving a workable arrangement.

By far the most interesting development, which is now at design stage, is the proposed production of a kennel unit which will incorporate into the overall structure the actual milking parlour, including collection and dispersal facilities, under cover. This will result in a complete 'package deal' dairy housing system and cannot fail to be an attractive proposition.

The application of 'package deal' principles to dairy buildings was long overdue and clearly kennels are here to stay. They provide clean and comfortable accommodation at a lower cost than other methods of housing but have the disadvantage of being somewhat inflexible. Slurry disposal can be a major problem although the majority of farmers could cope.

If, after weighing up all the pros and cons, a kennel layout is selected the decision should not be regretted either by the farmer, cowman or cows.

The thought and action taken by seven farmers to form the Trecastle Calf Group is an important step in store cattle marketing

Co-operation —

a step in the right direction

W. G. Owen

THE Brecon and Radnor Suckled Calf Association has, since its inception, been in the forefront in store cattle marketing. Within this field of operation the Association recognized that an important sale outlet existed in the form of single-suckled calves. The members were also able to bring considerable uniformity into these calves because of the widespread distribution of the Hereford breed within the two counties.

In recent years the Association has been able to turn its attention to refinements in the organization of its annual sales. These have attracted an increasing number of calves every year and the strength of the Association has enabled it to call on the services of experts in the field of market research.

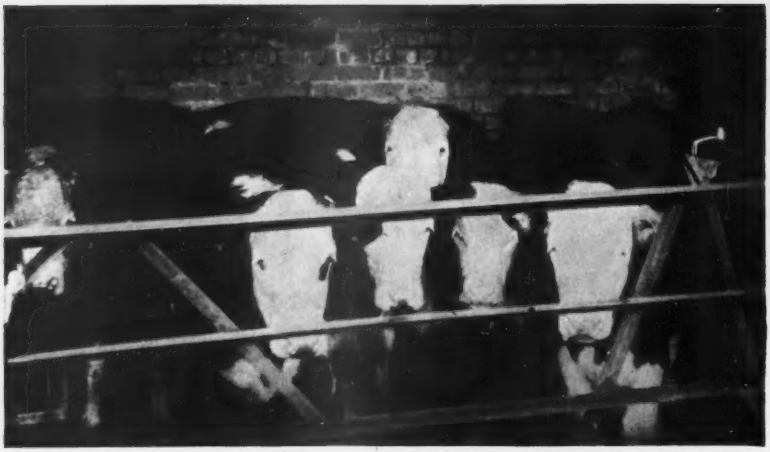
One such service provided by Produce Studies Ltd. reported on the sales organization and the views of buyers of Brecon and Radnor calves. The report also stated that buyers would prefer to bid for calves presented in bigger numbers per lot. The average lot size at the Sennybridge sale in 1967 was three animals.

The Suckled Calf Association itself was already aware of this need to persuade vendors of small groups of calves to co-operate. They are in fact prepared to waive the sale levy for such producers that present larger groups of well-matched calves.

Little progress in this field has been made previously. The reasons have been the fairly good price levels which existed up to 1965, also the fact that small producers lacked the organization necessary for grouping cattle.

The Study Group

Early in January, 1967, seven Trecastle farmers joined a Farm Management Study Group organized by the N.A.A.S. The Group discussed in confidence its own members' farm accounts, and also all aspects of farming applicable to their own particular problems. Co-operation was considered at some length including possibilities it could offer in the field of joint livestock ventures. In this connection the existing organization of the local sale at Sennybridge was borne in mind. Members of the study group were all producers of calves for sale at this centre and had a similar farming pattern.



Grouped cattle at Sennybridge

The group looked into the possibilities of joining forces to pool all their calves at the time of sale. The next steps were to consult the auctioneers who were extremely helpful and to put forward proposals to the Suckled Calf Association. The Association warmly welcomed this move and gave publicity to it well in advance of the sale.

At this stage there seemed to be two difficult problems to solve:

1. How to group the cattle from the various producers.
2. How to identify the groups once they were sorted out.

Grouping of cattle

It appeared necessary to group according to breed, type, weight, sex and if possible colour, though possibly the last might well be the least consideration. Weight groups were decided upon according to local experience and after a preview of the cattle. These were as follows:

Weight range	Colour of ear tag
3½—4 cwt	Light blue
4 —4½ cwt	Yellow
4½—5 cwt	Green
5 —6 cwt	Red
6 —7 cwt	Blue

All the cattle were weighed and ear-tagged accordingly. It is one of the most astonishing aspects of the whole venture that the cattle were not seen together until the sale day.

Sale of cattle

A chairman and secretary were elected for the group and they met on the night prior to the sale to agree on the minimum price acceptable for each lot. As members already had an opportunity of assessing the trade for suckled-calves at the Brecon sale, which is held on the day before the Sennybridge sale, the decisions were not too difficult to make. The responsibility of selling in the ring was then vested in the Chairman.

Numbers sold based on weight, breed and sex

Breed	*Sex*	3½–4 *cwt*	4–4½ *cwt*	4½–5 *cwt*	5–6 *cwt*	6–7 *cwt*	*Total*
Hereford	S				22	10	32
	H	8					8
Hereford	S	12	11	12			35
Crosses	H		7	5	9		21
Hereford x Friesian	S	5	3	8	6	4	26
	H						—
Welsh Black	S		3	4	4	—	11
Crosses	H	3	2				5
Total		28	26	29	41	14	138

When its turn came, the auctioneers announced the entry of the Trecastle Calf Group, the number in the lot and the average weight. There was an instant interest taken by buyers and the bidding was brisk. Prices for the grouped cattle were estimated to be up to £2 per head on average better than ungrouped cattle.

In the case of a particularly poor trade for cattle the grouping of calves in attractive bunches could mean the difference between a sale and no sale. From the point of view of presentation at the sale, there were attractions to the buyer in the form of larger sized lots averaging 6·9 animals and cattle of known weight.

The achievement at Sennybridge is not to be measured in terms of extra price for the calves, but in the degree of co-operation involved in the venture. Seven farmers agreed to sink their individuality in an effort to benefit the group. Such calves are an important and valuable output in the farming economy of the district. Every farmer likes to show his calves in the best possible manner, but it would be difficult to surpass the presentation achieved at this sale by the seven farmers acting together.

This is the first time for even seven farmers to join together to sell calves in the Brecon and Radnor Sales; future developments in this field of livestock marketing will certainly benefit from the experience of those concerned.

Acknowledgment

The author wishes to acknowledge the assistance given by Mr. A. W. Prowel, C.A.A., and Mr. Henry Edmunds, Deputy Director, N.A.A.S. Wales in the preparation of this article, and the team effort involved by N.A.A.S. Livestock Husbandry Advisers, the seven farmers concerned, auctioneers, and Brecon and Radnor Suckled Calf Association.

This article has been contributed by **W. G. Owen, B.Sc. (Agric.) (Hons.),** who is a District Agricultural Adviser with the National Agricultural Advisory Service in Caernarvon.

Calf Subsidy

From 2nd September, 1968, the rates of calf subsidy payable following deadweight certification (known as Stage B) will be increased by £1 a head to £11 5*s.* for eligible steer carcasses and £9 for eligible heifer carcasses. These rates will then be the same as those payable following live certification (Stage A) on eligible calves born on or after 1st January, 1967.

Important announcement. *The B.B.C. is to televise a weekly series to encourage tractor drivers to look after their equipment. The first programme will be shown on* ***Thursday, 10th October, 1968.***

Farm Mechanization

THE BBC, after two successful series of autumn programmes for stockmen, is to screen weekly a series for tractor drivers starting on Thursday, 10th October at 12.30 p.m. to the 12th December. It will be a practical and down to earth series by being aimed at the man on the job. It is not intended to screen an advanced course such as might be suitable for the farm fitter or agricultural engineer but to show a series of programmes with advice on maintenance for the operator.

Combines

British agriculture is the most highly mechanized in the world and operators with very little opportunity for training are faced with the care of a range of sophisticated machines costing thousands of pounds. It is vital, for example, that the high capacity combine harvesters should go through the harvest with as little mechanical trouble as possible, for even a few days delay in tricky weather can spell disaster for the farmer. This is a machine that is only used for a few weeks every year yet the operator must be ready to deal with a variety of problems, move over the ground as quickly as possible and keep grain loss to a minimum. Farmers will often pursue a new variety of barley or other cereal that has proved to give an increased yield of one cwt per acre, whilst a combine harvester operator loses more than the additional yield over the back. With weathermen giving a gloomy forecast at harvest time, the need is for speed and here there may be a conflict between farmer and operator, so a compromise on occasions may have to be reached between speed of work and an acceptable grain loss under the circumstances. These are the sort of problems the programme on combines will deal with, but a whole range of other equipment will be covered in the ten programmes that make up the new series called 'Farm Mechanization'.

Tractors and ploughing

Starting with the tractor, viewers will be shown the principle of how a diesel engine works. This will be done to stress the need for cleanliness, clean air and fuel and, very important, keeping dirt out of the hydraulic system. The basic cultivation tool on the majority of our farms is the plough and, for those with conventional ploughs, there will be a demonstration

of setting out the work and advice also for operators of the reversible plough, such as matching up furrows and correcting faults in the work. Later, other cultivation tools will be discussed, together with preparing seedbeds on problem soils, the one-pass technique, cultivations on high farms with rock near the surface and that ever-present problem of panning and wheelings.

Drills and irrigation machinery

Drills come next and there is plenty to deal with here, calibration, operation, storage and the particular problems that are likely to affect the operator of precision drills. Then, following combine harvesters will be irrigation, care of the pump, moving pipes in a way to make the job easier and storage of pipes.

Bill Wheeler, who will introduce the series, discussing a script with John North, Crop Husbandry Adviser for N.A.A.S. in the Eastern Region who will take the programme on 'Irrigation'

Other machinery and cultivations

Grassland machinery takes a whole programme and this includes practical advice on mower maintenance and other equipment. For potato growers, a whole programme on harvesters where a successful operation is linked with cultivations and finally transport and handling, including the right way for the tractor driver to operate a fore-end loader to speed up the work, and at the same time reduce wear and tear on the tractor. I hope we shall not be criticized for not devoting a programme to safety but we feel it wrong to take safety out of context in a series of this kind. We considered it preferable to make safety points with the various operations as we deal with them. We shall not be concerned with the legislation aspect so much as common sense, for it is so often a moment of thoughtlessness which causes a tragedy.

Tutors notes

Ministry of Agriculture officials who are thinking of organizing a viewing group can obtain Tutors Notes free of charge from the Further Education Liaison Office, Broadcasting House, London W.1. Viewers can get notes,

to be prepared in co-operation with the Ministry of Agriculture, Fisheries and Food, for any programme in which they might be particularly interested from 'Farm Mechanisation', British Broadcasting Corporation, All Saints Green, Norwich. One last plea to farmers. Please remind your farm machinery operator to watch the following BBC-1 programmes on Thursdays at 12.30 starting 10th October. The programme will not encourage tractor drivers to tackle jobs that should be done by qualified engineers, but we shall encourage them to look after their equipment and take a pride in the job.

10th October—The tractor	14th November—Combine harvester
17th October—Ploughing	21st November—Irrigation
24th October—Cultivations	28th November—Grassland machinery
31st October—Drilling	5th December—Potato harvesters
7th November—Spraying	12th December—Transport and handling

The Ministry's Publications

Since the list published in the September, 1968 issue of *Agriculture* (p. 446) the following publications have been issued.

MAJOR PUBLICATIONS

Bulletin 204. Grass and Clover Crops for Seed (New). 7*s.* 9*d.* (by post 8*s.* 4*d.*)
Experimental Horticulture No. 18. (New) 9*s.* 6*d.* (by post 10*s.* 1*d.*)
Experimental Husbandry No. 16 (New) 9*s.* 6*d.* (by post 10*s.* 1*d.*)
Farm as a Business—Aids to Management 4. Pigs (Revised) 2*s.* 6*d.* (by post 3*s.*)
Technical Bulletin No. 17. Bacteriological Techniques for Dairy Purposes (New) 13*s.* 6*d.* (by post 14*s.* 3*d.*)

FREE ISSUES

ADVISORY LEAFLETS

No. 51. Thistles and their Control (Revised)
No. 88. Mussel Scale and Brown Scale (Revised)
No. 351. Summer and Autumn Cabbage (Revised)
No. 557. Rabbit Meat Production—Economics and a Recording System (New)
No. 559. Botrytis Disease of Lettuce (New)

SHORT TERM LEAFLETS

No. 35. Atmosphere Control in Fruit Stores (Revised)

UNNUMBERED LEAFLETS

Code of Practice for Ground Spraying (Revised)
Colorado Beetle Poster (New)
Couch (New)
Do's and Don't's for Users of Chemical Sprays (Revised)
Tree Felling, Hauling and Scrubland Clearance (Revised)

The priced publications are obtainable from Government Bookshops (addresses on p. 508) or through any bookseller. Single copies of the free items are obtainable only from the Ministry (Publications), Tolcarne Drive, Pinner, Middlesex.

16. North East Essex

W. K. Turner

THE Tendring Hundred has long been famous for arable farming, but not for its grassland. Nevertheless, in the area bounded by Clacton-on-Sea, Harwich and Colchester there are a number of farmers who manage to make a success of dairying under circumstances that could hardly be described as ideal. In the main, the locality has a light soil and an annual rainfall of under 20 in. In common with the rest of the country, considerable economic limitations have been felt in the area and these, together with a shortage of good cowmen, have led to many dairy farmers changing to an all arable unit. In particular, this has applied to the medium and large farms where the output from an arable rotation made the change economically sensible. For the small farms (i.e., under 100 acres) of which there are still a number left in the Tendring Hundred, such a system can no longer produce a satisfactory farm income and so these smaller units remain in, or return to, dairy farming.

An example of the problems facing the smaller milk producer in this locality is to be found at Gods House Farm, Ardleigh, near Colchester, farmed by Mr. Beresford Morgan and his son David. On their farm are concentrated most of the difficulties that could be met in dairying. It consists of thirty acres of light sandy loam in an area where the rainfall is not only very low but precarious, spring and summer droughts being a frequent hazard.

Since taking over the farm, Mr. Morgan has built up a herd of 45 Friesians each producing over 1,000 gallons of milk a year. The thirty acres are almost all sown with perennial ryegrass, which, with the exception of some rented summer grazing for followers, support the entire herd. Paddocks, with the help of electric fencing, enable the grass to be intensively grazed from early March to the end of October, after which kale and hay form the mainstay of the winter ration.

Considerable further expansion is planned as a means of combating the economic pressures that are bound to occur under the present system. The key to this expansion is a plan to introduce irrigation to ensure plenty of spring and summer grazing. This will allow a substantial increase in cow numbers and over the next two years the herd is to be increased to 65 cows. The irrigated grassland will receive 200–300 units of nitrogen and be intensively paddock grazed. A succession of high-yielding ryegrasses is being established as the basis of the leys and it is hoped to stretch the grazing season from early March to early November, depending on the prevailing

weather. This expansion will necessitate a reduction in the amount of hay made, but fortunately the extensive arable acres of East Anglia produce a good supply of by-products. Straw, beet pulp, brewers grains and potatoes can all be used to replace a substantial part of the present winter hay ration. Irrigation, more cows per acre and an intensive system of grassland management will, it is hoped, help to solve the particular difficulties of this small farm.

Further east, at Walton-on-the-Naze, a much larger farm has been undergoing a similar exercise, but with a different approach. Mr. John Fleming farms in partnership with his father on 400 acres of medium to heavy loam. In recent years the 'mixed' farming system included a dairy herd and followers on 100 acres of three–four year leys, with cereals, peas, potatoes and sugar beet. Now, conscious of the fact that his 80-cow herd will gradually become too small an economic unit under his circumstances, Mr. Fleming has set about the problem of the future structure of Birch Hall Farm. After detailed costing and budgeting, a full-scale expansion of the dairy herd was shown to be the most promising solution, despite the local trend for the simplification of farm systems to two or three arable crops. The plan is to establish a herd of 240 cows during the next twelve months.

The management of the herd over the past few years has been 'traditional'. Grazing began in early March using ryegrass swards until midsummer, when timothy-meadow fescue leys took over, these having proved successful under drought conditions. In spite of being in this very dry coastal belt of Essex, the herd had been kept on a progressively smaller acreage each year. In fact, in 1967 a gross margin of £110 per cow was returned at a stocking rate of just over one acre per cow.

The success of this past system is not being ignored. Most of the plans for the management of the enlarged herd are to be a consolidation of methods found to be reliable with the smaller unit. However, some changes are necessary, in particular, the composition and management of the leys. Once again a succession of ryegrasses, coupled with high nitrogen use and paddocks, is likely to be the most practical system. The exact grazing pattern has yet to be decided because it is felt better to allow a grazing policy to evolve to suit particular conditions rather than to start with a rigid plan. A probable change is likely to be the splitting of the herd into two or three sections. Unlike Gcds House Farm no irrigation is possible.

Flexibility has always been a feature of Mr. Fleming's methods of winter feeding. He sees no point in radically changing his proven technique of using several sources of bulk feed. Silage, hay and kale have all played an important part in the winter rations and provision has been made in the new buildings for feeding these and other bulky foods from self-unloading trailers. Concentrates will continue to be farm-mixed and will contain a substantial quantity of home-grown beans.

Work is now well under way erecting the new buildings to include cubicles for the 240 cows and the latest refinement a 10–20 herring-bone parlour. The inevitable slurry problem is to be countered as much as possible with the sensible use of straw, thus keeping it solid enough to be handled with conventional equipment.

Although these two farms exist under widely differing circumstances, it is notable that they have arrived at much the same conclusion for improving profitability. In both cases, it will depend on the most efficient use of their available resources, combined with a high degree of management of both cows and grass.

Oak, elm and willows alongside an open ditch

Hedgerow Timber

R. H. Johnstone, *Agricultural Land Service, Chelmsford*

IN a previous article in this series* the various factors to be taken into account before deciding to remove hedges were discussed. It emphasized that on many farms hedges are needed perhaps to provide a field boundary, a windbreak for stock and crops or to prevent soil erosion. Where after careful assessment it is decided that there is this need why not consider how hedges can earn their keep?

The annual maintenance costs of keeping a hedge stock-proof and neat can often be offset by the return from trees grown in or alongside hedges. The timber produced can be sold to local timber merchants in addition to meeting the normal demands on a farm for repairs to fences and gates or for firewood. The trees can be treated as a crop in which the costs of production are minimal and the returns can provide a regular income and a useful

* See Agriculture Vol. 75 No. 1, January, 1968, pages 43-44.

long-term investment. It is worth while considering some of the ways in which a regular return can be achieved:

1. Care must be taken when cutting a hedge, particularly with a mechanical trimmer, to ensure that young saplings are not destroyed. It is much easier if nature is allowed to spread its own seed rather than planting nursery stock in hedgerows which is expensive. Some of the magnificent elms which have been naturally regenerated, seen in some hedgerows in this country, provide a good example of this.
2. Unless a shelter-belt is needed, keep the trees well spaced in an arable area to avoid undue wind turbulence, which may cause damage to grain crops.
3. Encourage the growth of trees which are native to the district.
4. Where there is an open ditch try growing trees on one of the banks. This has proved successful in some parts of East Anglia where cricket bat willows have been grown. There is very little disruption to farming operations because the trees are mature in about 14 years, there is comparatively little shade to crops, and the roots grow away from the field towards the ditch.
5. Discourage growth of trees near the outfall of land drains to avoid disturbance to the drains by the roots.
6. Where a fence is needed because a hedge is not stock-proof avoid using the trees as a post by nailing the wire to the trunk. As soon as a timber merchant realizes that a tree has a collection of ironmongery hidden in the bark he is wary, since this could be the source of serious damage to his saws. Instead of having an asset in the tree the farmer would most probably find it was a liability as the timber merchant may charge him to remove it.
7. Trees must be felled where they are inconveniencing agricultural production or cultivation. This may arise where there is a change in farming policy, or where a tree has grown to an extent where an arable crop is suffering from excessive shade. It is often a good idea to fell hedgerow trees before they are fully mature, particularly if there is a local demand for rustic poles, stakes and fencing material.

The main objective in farming is food production, but this need not be the sole objective. The land can be enhanced by allowing hedgerow trees to develop and produce timber. Apart from the added beauty of having trees on a farm, an income can also be obtained from them. These added objectives can also be achieved by planting trees in rough areas, on banks, dry ponds and corners of the farm which cannot be cultivated.

At present there is no Government incentive in the way of a direct grant to encourage more careful attention to hedges and the production of hedgerow timber. However, this should not deter a farmer from improving both his farm and his income. In this connection it should be mentioned that a landowner is entitled to fell 825 cu. ft of timber in any one quarter without obtaining a felling licence. Of this volume, 150 cu. ft can be sold, but if more is sold, a felling licence is needed from the Forestry Commission.

in brief

- **Poultry: Nipples or troughs?**
- **Game as a farm crop**
- **Light in the poultry house**

Poultry: Nipples or troughs?

ALTHOUGH a large number of poultry farmers have been won over to the idea of nipple drinkers for their caged laying birds, a sizeable body of opinion still favours the conventional trough. Certainly there are arguments for and against both systems of drinking water supply. Pre-eminently, the attraction of nipples is the labour saved in cleaning out water troughs, and advocates also point to the possible saving in food, since meal is wasted by getting into the troughs or, where there is a continuous flow system, carried out through the exit pipe. But before an objective assessment can be made we need to know more precisely what the hen's reactions are, and the only index to that is their laying performance.

There is no question of the intelligence and ability of birds to take what water they need from nipple drinkers, although drinking from troughs is patently more natural. But when several birds are competing for a single nipple it is not surprising to find that some of them may drink less than they otherwise would. How does this affect egg production?—for that is the question of primary importance to the poultryman.

Guidance on this problem comes from three years of experiment at the N.A.A.S. Gleadthorpe farm. Here one lot of 240 light-heavy cross pullets, housed two to a cage in 18 × 15 in. cages, were supplied with water in drip-feed troughs; a similar group were supplied by nipple drinkers placed on the outside of each alternate division, so that one nipple served four birds.

In a 48 weeks laying period the trough birds each laid on average six more eggs than the nipple drinkers — and this was consistent for all three years. The eggs were also slightly heavier, although grading differences were small. The trough birds drank more water which, calculated on a hen-housed basis, worked out at 0·43 gal per bird, per week, compared with 0·28 gal by the nipple drinkers.

What the correct ratio of birds to nipples should be, and where and what height the nipples should be placed are still matters of general controversy, but it is interesting that in a single year's experiment at Gleadthorpe, when one nipple served only two birds, egg production was as good as that from the trough drinking birds. Recovery of wasted food from the troughs did not exceed 0·5 per cent of that supplied and is not therefore significant.

Mr. P. N. Harvey, Farm Director of Gleadthorpe, summed up their experience. At one to four birds the higher egg production of the trough drinkers, offset by a small extra feed cost, resulted in an extra margin of income from eggs over feed cost in lay of about 1*s.* 3*d.* per bird. On the other hand, labour costs are higher for trough drinkers. An estimate of labour needed on a 2,000 bird unit is 9*d.* per bird for trough drinkers and 1*d.* per bird for nipple drinkers. Thus on the original installation of nipple drinkers the advantage of reduced labour cost was lost in reduced output of eggs. But the limited evidence from a single season suggests that egg production from birds provided with more accessible nipples (one per cage of two birds) is as good as from birds supplied by troughs. If this is confirmed in subsequent work, the saving in labour by using nipple drinkers will be all gain and will confirm the trend towards this type of drinker in commercial practice.

Game as a farm crop

EVERY year the Ely Game Advisory Station, at Fordingbridge, notches up additional successes both in its experimental field work and its advisory service to farmers and landowners. The idea of a planned and well-produced secondary crop of game birds, whether pheasants, partridges or wild fowl, seems to be steadily gaining adherents. The Station's *Annual Review* for 1967–68 records the encouraging response of landowners and others to the one-day Game Symposium inaugurated in Cornwall last year on the Mahomet-to-the-mountain principle. It is proposed to extend this type of event to other parts of the country, which should prove a popular move and result in more people going to Fordingbridge to see for themselves the close partnership that exists there between precept and practice.

In an age of advanced farming technology, with its consequential backlash on ecology, a fresh and scientific approach to game management is essential. More and more mechanization, changes in cropping, less winter cover, fewer hedgerows, spreading urbanization, to mention only a few of the influences, have made their mark on the old style of game preservation.

Sixty professional keepers attended the two-day refresher course, and 35 young trainee keepers enjoyed a week's course on a wide range of subjects embracing deer control, river keepering, taxidermy, gun safety and dog training.

In the year under review wild pheasant stocks are reported to be extremely high almost everywhere; few pheasant shoots were not affected, directly or indirectly, by the foot-and-mouth disease restrictions. For the first time since 1962 some emergence is seen from the doldrums of partridge rearing, with a rise of about 14 per cent in the number of pairs counted in the latest census. 'On most estates', says the Review, 'winter loss is still running at a relatively high figure and emphasizes the oft-repeated and very valid point that if a large population is to be maintained well-distributed 'green food' is essential; grass leys perhaps breaking up a desert of bare plough.' A complementary article points to the various cereal break crops, including grass, which have an ancillary value in providing cover for game birds. Duck numbers, excluding teal, are quoted as being well up to average and, like the wood-pigeon, have benefited from a second successive mild winter.

Light in the poultry house

THE practical value of controlling light intensity in poultry houses to govern both the rearing and laying phases is now largely beyond controversy. It is accepted that lighting patterns should give a short day during rearing and a rising day-length during lay. T. R. Morris, studying the subject last year, found that for effective day-length control the light intensity in the dark part of the day must be below 0·04 ft candles. But how efficient are some designs of windowless houses in this respect?

The South Western region of the National Agricultural Advisory Service has been looking into this question and reports on it in the current issue of the *N.A.A.S. Quarterly Review**. In several designs of windowless houses the exclusion of natural light was found to be inadequate. With a conventional type of roof fan and wall inlets, the whole floor area may be subject to natural day-length if the inlet shutters are not properly adjusted. In one house studied in detail the extractors allowed as much as one-quarter of the floor area to be naturally illuminated. Wall extractors gave a better light control, but in the houses surveyed there was still room for considerable improvement. Of all the extractor units examined in terms of light intensity, the fan with external hood and an internal baffle was the most effective—a maximum of about 10 per cent of the floor area being lit naturally.

The answer, suggest the authors, D. R. Charles and P. G. Spencer, lies in the provision of comparatively cheap baffles which can do the job of preventing light leakage without undue loss of fan performance. 'Considerably more attention to detail than has been usual in the past is necessary,' they say, 'if control of environment is to give the results in the field of which it is potentially capable according to experimental results'.

AGRIC

*No. 80. H.M.S.O. price 3*s.* (by post 3*s.* 6*d.*)

Sir Dudley Stamp Memorial Fund

It is a little over two years since Sir Dudley Stamp died in Mexico. His great services to land use and agriculture were recorded in the December 1966 number of *Agriculture*.

His many friends in the industry and in the Ministry will want to know that a fund has been established in memory of Sir Dudley for the encouragement of geographical study and research especially by young geographers.

Sir Dudley was much concerned that young geographers should have opportunities to advance their knowledge: he had a lifelong belief in the value of international travel and research. The Trustees intend that the Fund shall be used for the provision of grants to young geographers to assist them in research or study travel leading to the advancement of geography and to international co-operation in the study of the subject. They have in mind, particularly, to strengthen the links between the geographers of Britain and those in other lands.

Readers of *Agriculture* who would like to know more about the Memorial Fund or to assist in founding it, are asked to get in touch with the Joint Honorary Secretaries, Dudley Stamp Memorial Fund, c/o London School of Economics, Houghton Street, Aldwych, London W.C.2.

'LITTLE NEDDY' REPORT

The Economic Development Committee ('Little Neddy') for the Agricultural Industry recently presented to Ministers a report which assessed the contribution British agriculture could make to import saving by 1972–3. Under the title 'Agriculture's Import Saving Role' this report is on sale at Her Majesty's Stationery Office, price 20*s*. net.

The contribution of each of the main farm products has been considered in detail, and calculations made of the additional capital and other physical resources which would be required to achieve an import saving of £220 m. a year.

Books

Cows, Crops and Grass on a Card Index. G. P. CHITTY and N. BOMFORD. Crosby Lockwood and Sons, 1967. 25*s*.

Although the authors refer to this as an 'advanced system of farm recording' it could be more accurately described as a method of summarizing certain essential physical and financial data in a convenient card index form. A recording system such as the N.F.U./N.A.A.S. Farm Record Book would provide most, but not necessarily all, of the required data.

There are six different cards, each measuring 7 in. × 5 in. in the set; (i) a Field Card—Crops, one for each separate field, entries on which largely comprise variable costs details and crop yields; (ii) a Crop Summary, one for each crop, summarizing the variable costs of individual fields and measuring that crop's gross margin; (iii) a Field Card—Grassland, one for each grass field, setting out, principally, the variable costs and summary of cow grazing days per month; (iv) a Grassland Summary, summarizing variable costs and grazing livestock gross margins and providing certain other ratios; (v) a Gross Margin Summary for the whole farm, and (vi) a Fixed Costs Summary. A special loose-leaf ring binder is available from the publishers.

The main provision on the Field Cards is for detailing financial outlays, but there is an adequate 'remarks' section for inserting relevant physical detail and other pertinent comments. The 'comparison with budget' which is provided for throughout, even to the details for individual fields, is a praiseworthy feature and one which is regrettably absent from so many management summaries. There are minor details of layout which might be improved upon, but, nevertheless, the system is a convenient means of summarizing management material, which will have particular appeal to that still relatively small but growing number of farmers who are interested in a field-by-field examination of their farm businesses.

B.P.

The Ecology of Soil Bacteria. Edited by T. R. G. GRAY and D. PARKINSON. Liverpool University Press, 1968. £7 10*s*.

This book contains 34 papers delivered at an international symposium on the ecology of soil bacteria held at Liverpool University in September, 1965. It is a companion volume to *The Ecology of Soil Fungi*, published in 1960. The book is in five sections: the environment of soil bacteria, methods for the isolation and estimation of activity of soil bacteria, the physiology of soil bacteria, the taxonomy of soil bacteria, bacteria in the root region of plants, and the growth of bacteria in soil. There is also a summary of the symposium by R. L. Starkey, an abstract of the discussions, and an index.

To quote H. G. Schlegel, one of the contributors, 'ecological research requires extensive and reliable information about the physiological and bio-chemical characteristics of organisms to be investigated. The spectrum of species and strains as well as their variability must be known'. The articles by R. E. Gordon, E. Küster and A. D. Rovira and P. G. Brisbane are particularly useful for anyone wanting to know the current state of play in the classification of soil bacteria. The section on the environment of soil bacteria contains a valuable review of the physical environment in soil by A. D. McLaren and J. Skujins.

Several articles, in particular that by J. L. Lockwood on the interactions between fungi and bacteria in soil, and that by J. E. Crosse on bacterial plant pathogens, are particularly helpful in that they bring together a very scattered literature. D. J. Greenwood's paper on the measurement of microbial metabolism in soil introduces a welcome quantitative approach. F. E. Clark's paper on the growth of bacteria in soil and V. Jensen's on the plate count technique are particularly valuable in that both are highly critical of certain current assumptions in their respective fields. Most of the other contributions are on a high level: it is impossible to refer to them all.

The book has little immediate bearing on practical agriculture: its main appeal will be to those concerned with the scientific study of soil and soil life. Because of the delay in its appearance, most of the new work presented at the Symposium is by now in print elsewhere. However, progress in soil ecology is not so fast that the reviews and speculations this book contains are now out of date: anyone working on soil ecology or biochemistry will use and quote it for years to come.

D.S.J.

Insects and Physiology. Edited by J. W. L. BEAMENT and J. E. TREHERNE. Oliver and Boyd, 1967. £6 10*s*.

When Sir Vincent Wigglesworth became due to retire as Director of the Agricultural Research Unit of Insect Physiology, his colleagues thought that a permanent tribute should be paid to him in recognition of his pioneering work in the study of insect physiology. Their tribute is this collection of essays by former colleagues and research students in the Unit and the Cambridge University Department of Zoology, and friends in several parts of the world. Resulting from its origin, the book has an air of intimacy which almost makes the reviewer feel that he is intruding upon private preserves. Nevertheless, it is appropriate in *Agriculture* to add another tribute, namely, to acknowledge Sir Vincent's interest in and concern for the development of economic entomology in this country. For more than a quarter of a century he was a most valued member of the Ministry's Conference of Advisory Entomologists, where he represented the Agricultural Research Council.

This book follows, fairly closely, the lines of Sir Vincent's classic work *The Principles of Insect Physiology* of which there have been six editions (1939–65) and it emphasizes the rapidity with which the subject has developed. It also illustrates the enormous breadth of Sir Vincent's interest and influence. Twenty-three prominent biologists, mainly insect physiologists, have contributed and their essays are arranged in sections dealing with the integument, morphogenesis, neurosecretion, flight, the central nervous system, pharmacology, sensory physiology, behaviour, permeability and reproduction.

It may be asked whether such a highly academic work is relevant to agriculture and the answer must be that even if the direct application of the subjects is not obvious, they are of direct and fundamental importance to the study of economic entomology and hence, pest control. Simply, insect physiology is concerned with 'how insects tick' and to know this is of obvious value in understanding insect pest control. For example, knowledge of the various structures helps in the understanding of how insecticides penetrate insects, how they act on them and of the kind of chemical that may have insecticidal activity; while information on flight, behaviour and the senses, assists in explaining many aspects of insect activity that are of direct economic importance.

The Editors are to be congratulated on having stimulated an excellent collection of essays and the publishers on having produced a volume that it is a pleasure to handle, and with good clear type and illustrations. It is expensive but good value and it should delight Sir Vincent.

F.H.J.

The Grafter's Handbook. R. J. GARNER. Faber and Faber, 1967. 30*s*.

This is the third edition of the excellent book first published in 1947, and generally acknowledged as the most comprehensive book on the subject of grafting published anywhere in the world. In support of this statement is the fact that the last edition of *The Grafter's Handbook* was translated into Russian in the U.S.S.R., and published in its entirety there both as a text-book for use by students and others and in the form of micro-film (without, it should be mentioned, the author's pre-knowledge).

A technical book of this kind could not establish such a wide reputation without being essentially sound in its approach to the subject. The book is very well written and printed and includes many valuable photographs and line drawings, the latter being made by the author himself.

The present edition differs little from the second one with the exception of the addition of new appendices dealing with replant diseases and their control, weed control in nurseries by means of herbicides and the most recent information on the technique of propagation of deciduous woody plants by means of hardwood cuttings. The appendix dealing with the latter subject brings it right up to date following the further developments of the warm storage treatments carried out at East Malling Research Station by Dr. B. H. Howard, a colleague of Mr. R. J. Garner. No doubt in future editions of the handbook the information given in these appendices will, where appropriate, be included in the main text.

The increasing and now widespread use throughout the world today of vegetatively-propagated clonal rootstocks, especially for apples, and the move towards the intensification of orchard planting, means that more than ever it is essential that the nurserymen and others engaged in fruit tree production should have the best advice and information possible on propagation and such is given in this book.

Apart from chapters dealing with such subjects as compatibility, rootstocks and

their propagation and the collection and treatment of scion wood, there are very detailed descriptions of different methods of grafting and budding. Some of these are of historical interest and it is valuable to have them all brought together in this way.

The art of grafting is one which, as the author points out, is of great antiquity and even in ancient Greece and at the time of the Romans, was in common use for propagation of many types of plants. This ancient art has, therefore, been preserved in various forms for many thousands of years and *The Grafter's Handbook* ensures that knowledge of it will be preserved for generations to come!

F.A.R.

Grass Conservation Handbook. Edited by MARY CHERRY. Iliffe Books, 1968. 25*s.* (by post 25*s.* 7*d.*).

This booklet is the best of its kind and should be read and fully understood by every livestock farmer. The text is based on the Grass Conservation Conference held at Bristol in 1967, and provides up-to-date information on a subject where rapid changes in knowledge and outlook are currently taking place. The Editor has done a remarkable job, if only to offer quite implicit recommendations in the certain knowledge that many of these must be out of date within 3–4 years. This in no way detracts from the value of the book but it does mean that a second edition is a must, very early in the 1970s.

The first half deals with the science on which practical methods of conservation must rest and these principles will stand the test of time. The second part covers more immediate practical issues when making quality hay, dried grass or silage. Adequate details are given on field harvesting, mechanization of that harvest, transport, storage and the feeding of conserved products. Reference is made to crops other than grass, such as maize and whole crop cereals, pointing out the disadvantages as well as the advantages of these crops. Current comparative costs are mentioned for various sections but these must be transient and will become obsolete as prices change and new techniques are evolved.

Altogether, an admirable effort which will add to British prestige at home and abroad; a prestige which internationally is already high in the sectors dealing with growth and use of grass.

W.D.

Horticultural Buildings Pocketbook.
AGRICULTURAL LAND SERVICE (MINISTRY OF AGRICULTURE, FISHERIES AND FOOD). H.M.S.O. 3*s.* 6*d.*

My first and immediate reaction on receiving a copy of this pocketbook was what a useful idea. Reading it through shows how the Agricultural Land Service has built up their extensive and yet detailed knowledge. Until recently, there were few people who could claim anything like a comprehensive knowledge of buildings for horticulture. Most were adaptations, frequently produced with little understanding of the principles behind requirements.

Credit must be given to the concepts of the Land Service and to the enthusiastic interest its officers bring to developments in horticultural aid. The usefulness of the pocketbook is the easy reference to all essential items with which we are concerned. Undoubtedly, omissions will turn up and be inserted, and some deletions may be desirable. For example, types of greenhouses; conventional cucumber houses of pre-1945 models are unlikely to be perpetuated.

The appendices covering insulation data, safety health and welfare, conversions and references to appropriate publications will be of utmost value.

Altogether, I can see it as a genuine pocket or desk top friend to the grower, adviser, and perhaps most of all to the student or trainee. A must on the smallest personal bookshelf.

G.D.L.

T.V. Vet. Book for Pig Farmers. THE T.V. VET. Farming Press, 1967. 35*s.*

This is a pictorial veterinary book for pig farmers with a sub-title 'How to recognize and treat common pig ailments'.

Following some general advice, the book deals successively with the diseases of the sow and litter, diseases of weaners and older pigs, general diseases and ailments, and finishes in some respects with the best part called 'General Hints'. The author has not attempted the impossible task of making a pig keeper his own veterinary surgeon. In his preface he states 'Effective disease control is not possible without the combination of first-class husbandry and the closest co-operation with the veterinary surgeon. The accent must always be on keeping the pigs healthy rather than on treating disease' and throughout the book his advice is directed to that end.

Placed in the 133 pages of the text are 286 action photographs. These have their limitations and only rarely portray symptoms of disease adequately but they do make the book easy to digest even after a heavy day's work. In fact, the whole book should be given a prompt preliminary reading because the index is not sufficiently comprehensive and one must familiarize oneself with it in order to seek information in a hurry. This book will almost certainly earn a second edition for which a fuller index should be considered. The photographs are invaluable when the author discusses, for example, making a catching crate, building up a pigman's veterinary list, carrying out inspections, castration and detusking.

This volume will also appeal to many outside the ranks of pig farmers and no one is likely to lament paying thirty five shillings for the easily absorbed information.

J.W.R.P.

Linear Programming and Animal Nutrition. J. B. DENT and H. CASEY. Crosby Lockwood, 1967. 35*s*.

This is a first-class book, for the right people. Let nobody be deceived by the dust-cover blurb that 'it assumes no knowledge of mathematics beyond an appreciation of the notation used in first year algebra'. First year at Grammar school or University? Any eleven-plusser capable of working through these pages should be dispatched immediately to join his equals, Newton and Einstein. The less precocious pupil, given a few years extra maturity and blest with a mathematical bent, could indeed make something of it if a knowledge of the technical terms used in animal nutrition were added to his facility with equations.

Honest Farmer Smith, accustomed to saving a few pounds by using set recipes for his home-mixing, would be well advised to remain content with that and not to strive after the last possible penny. On the other hand the professional farm manager of a large estate with many enterprises and hundreds of animals in each, or the nutrition adviser of a firm of feedingstuff compounders (to both of whom a slight variation in the cost of ingredients might mean a large variation in profit) would gain much by a mastery of the principles set forth so clearly.

The book is written in a most helpful style, and with a delightful sense of humour which is manifest even in the first half-page. In the first two chapters, the authors gently lead one on from a simple 'two ingredient' ration to one with three, and illustrate how to arrive at the 'least cost' mix. Then follow problems on the best way (maximization) of managing an all-grass farm—how much to graze, to hay, to ensile. The economic interpretation of feeding standards and the compounder's problems including the optimal use of ingredients in short supply and adjustment to seasonal surpluses (e.g., the cereal harvest) are also discussed.

As already hinted, the value of the book is mainly for the professionals and academics, although anyone with reasonable mathematical attainments and the will to work could also benefit. The volume is well-produced and only a few minor misprints have been noted.

S.M.B.

books received

Rosewarne Experimental Horticulture Station. 13th Report 1967. Ministry of Agriculture, Fisheries and Food.

Luddington Experimental Horticulture Station Report for 1967. Ministry of Agriculture, Fisheries and Food.

A Short Guide to the Station and its Work. Stockbridge House Experimental Horticulture Station. Ministry of Agriculture, Fisheries and Food.

Field-by-Field Guide to Crops and Investigations 1968. Arthur Rickwood Experimental Husbandry Farm. Ministry of Agriculture, Fisheries and Food.

Plum Preliminary Cultivar. Trial 1. (National Fruit Trials, Brogdale Farm). Ministry of Agriculture, Fisheries and Food.

Forest Research 1967. Forestry Commission. H.M.S.O. 17*s*. 6*d*.

Game on the Farm. Booklet No. 20. Copies from Eley Game Advisory Station, Fordingbridge, Hampshire. 3*s*. 6*d*.

Management in Fruit Growing. R. R. W. Folley. Copies from Publications, Wye College, Ashford, Kent. 7*s*. 6*d*. (including postage).

Department of Hop Research Annual Report 1967. Wye College. 6*s*.

Agricultural Chemicals Approval Scheme

Since the publication of the 1968 List, the following products have been approved:

INSECTICIDES

CHLORPROPHAM with PROPHAM
For the prevention of sprouting of ware potatoes stored in buildings.
Liquid Formulations
Pommetrol—Fletcher

CHLORFENVINPHOS with ORGANOMERCURY
Reduces damage by wheat bulb fly and controls bunt of winter wheat.
Dry Seed Dressing
Sapecron Seed Dressing—Plant Protection

HERBICIDES

DALAPON
Sodium Salt Formulations
Campbell's Dalapon—Campbell's (Sales)
Southern's Dalapon—Thos. Southern

DICHLOBENIL
Soil acting residual herbicide for the control of annual and some perennial weeds in established blackcurrants, gooseberries and rhubarb.
Granular Formulations
Casoron G—Mi-dox

DINOSEB
Amine Salt Formulations
Dinbuph Special DNBP—Bugges
Weedkiller Concentrate.

DNOC in PETROLEUM OIL
Sterilite DNC Petroleum Winter Wash—Butler
Sterilite High DNC Petroleum Winter Wash—Butler

ETHION with ORGANOMERCURY
Reduces damage by wheat bulb fly and controls certain seed borne diseases of wheat.
Dry Seed Dressings
Embathion Seed Dressing—May & Baker

FENTIN HYDROXIDE
Wettable Powders
Croptex Fentin 20—Croptex

LENACIL
Wettable Powders
Du Pont Venzar Lenacil Weedkiller—Du Pont

Company Information

(i) W. J. Craven & Co. Ltd., has now ceased trading as such and their products have been withdrawn from the list.
(ii) The following firm has recently joined the Agricultural Chemicals Approval Scheme:
Du Pont (U.K.) Ltd., Du Pont House, 18 Bream's Buildings, Fetter Lane, London E.C.4. 01-242-9044

Additions to Supplement No. 1 of 'Chemicals for the Gardener'

ADCO SLUGTOX PELLETS
Based on metaldehyde—Adco

TOPGARD SYSTEMIC LIQUID—Pan Britannica
Based on formothion for control of greenfly, red spider, leafhopper and small caterpillars on flowers, fruits and vegetables.

Company Information

(i) W. J. Craven has now ceased trading as such and their products have been withdrawn from the booklet.
(ii) Fisons Horticulture Ltd. has now been reconstituted as part of Fisons Ltd., Cambridge Division, and their products are sold under that name.
(iii) Hoechst Chemicals Ltd., now reside at Hoechst House, Kew Bridge, Brentford, Middlesex.

ACKNOWLEDGMENT OF PHOTOGRAPHS

Front cover, *Farmers Weekly*. Pp. 460 and 462 Felicia Cronin. P.475 Rex Paterson. P.476 P. A. Naylor. P.483 Messrs. Hoopers of Moretonhampstead. P.495 British Broadcasting Corporation. P.499 R. H. Johnstone.

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OFFICIAL APPOINTMENTS

General agriculturists and agricultural specialists of many kinds are frequently required in the effort to match the large demand from the developing countries. The vacancies advertised below are a selection from the many openings which exist now. While they are being filled, other vacancies are arising.

Salaries within the ranges quoted are assessed on qualifications and experience; and the terms of most appointments include free or subsidised accommodation, education grants, family passages, good leave on full pay, etc. A contributory pension scheme is available in certain circumstances.

Most appointments are limited to nationals of the United Kingdom or the Republic of Ireland who are normally resident in those countries.

BRUNEI

(1) Plant Pathologist

RC 213/28/03

Duties: To take charge of a new research station in the Department of Agriculture, to draw up new plant importation rules, and to advise on the control of diseases of the State's main crop in particular for rice, oil palms, fruit and vegetables. Some lecturing may also be involved.

Qualifications: A University degree in Natural Science with Plant Pathology as a major subject, and at least seven years' experience in tropical agriculture. A knowledge of Malay would be an advantage.

(2) Entomologist

RC 28/03

Duties: To take charge of a new research station in the Department of Agriculture to study and record insect pests of rice, oil palms, coconuts, fruit and vegetables, and to advise on control measures. Some lecturing may also be involved.

Qualifications: A University degree in Natural Science with Entomology as the major subject, and at least seven years' overseas or post-graduate experience. A knowledge of Malay would be an advantage

Salaries: Brunei—$12,240–21,840 p.a. (£ Sterling 1,668–2,976 p.a.) plus an inducement allowance in the range of £ Sterling 327–556 p.a. Terminal gratuity 12½% of basic salary and inducement allowance. Contracts 3 years.

CARIBBEAN

Agriculturalist (Economist)

RC 213/35/02

Duties: To test the hypothesis that an Agro-Economic study can assist in setting priorities for Agricultural Research and in getting the best use from scarce research staff and facilities.

Qualifications and Terms: A degree in Agriculture with post-graduate qualifications in Agricultural Economics and experience in tropical agriculture. A knowledge of the area would also be a distinct advantage. Salary £1,750—£2,750 p.a. depending on qualifications and experience, subject to British Income Tax, plus a variable non-taxable overseas allowance ranging from £445—£1,095 according to marital status. Contract 1 year.

JORDAN

Farm Settlement Expert

RC 213/94/01

Duties: To be responsible for the layout of irrigated settlements in the Bedouin Settlement Project, and the general management of their crops.

Qualifications and Terms: A degree in Agriculture with practical experience in irrigation and the use of machinery. Salary £2,500—£3,000 p.a. according to experience and qualifications, subject to British Income Tax, plus a variable non-taxable overseas allowance

OFFICIAL APPOINTMENTS

JORDAN—*cont.*

ranging from £495—£1,125 p.a. depending on marital status. Single man preferred as mainly field work. Contract 2 years.

MALAWI

(1) Senior Settlement Officer

RC 213/134/018

Duties: To be responsible for all aspects of settlement schemes at present undertaken and envisaged and to compare them with settlement schemes elsewhere.

Qualifications: A degree in Agriculture or Estate Management with considerable experience in settlement, preferably in Africa. A practical knowledge of farm and settlement economics is essential; knowledge of African land tenure customs desirable.

(2) Senior Land Use Officer

RC 213/134/017

Duties: To examine the availability of land and to plan its development; to provide technical direction to land use services and farm management and to prepare conservation education programme and supervise credit service.

Qualifications: A degree in Agriculture and considerable experience in tropical farm planning and conservation measures.

Salaries: £2,200 p.a. plus an inducement allowance of £690 p.a. In addition a supplement of £100 p.a. is payable direct to the officer's bank account outside Malawi and Rhodesia. Terminal gratuity of 15%–25% free of Malawi income tax. Contracts 2–3 years.

MALAYSIA

Agricultural Education Adviser

RC 213/106/06

To be posted to new agricultural school in order to assist in planning the curriculum and practical work, to specify equipment and assist in its installation in the laboratory; to advise the Principal and to do some teaching.

Qualifications and Terms: A degree in Agriculture with experience in vocational agricultural training and teaching and the organising of vocational agricultural schools. Salary £2,500—£3,000 p.a. depending on qualifications and experience, subject to British Income Tax, plus a variable non-taxable overseas allowance ranging from £530—£1,605 p.a. according to marital status. Contract 2 years.

VENEZUELA

Adviser in Agricultural Statistics

RC 213/190/02

Duties: To improve the present system of continuous statistics on prices of agricultural products in the Department of Economics and Agricultural Statistics of the Ministry of Agriculture, covering wholesale and retail prices of agricultural products, prices paid by farmers for selective costs of production and those received by them on the sale of their products. To work out factors for weighting price indices and to train employees of the Statistics Division.

Qualifications and Terms: Candidates must be graduates of a recognised university with ample experience of handling price statistics and the implementation and supervision of statistical programmes. A knowledge of Spanish is desirable but not essential. If necessary, an intensive course in Spanish can be arranged. Salary: £2,750—£3,750 p.a. depending on qualifications and experience subject to British Income Tax plus a variable non-taxable overseas allowance ranging from £1,120—£2,225 p.a. according to marital status. Contract 1 year in the first instance.

If you wish to apply for any of these appointments, or you are interested generally in an appointment overseas, please write giving your full name, age and brief particulars of your professional qualifications and experience to the:

Appointments Officer
MINISTRY OF OVERSEAS DEVELOPMENT
Room 324a, Eland House, Stag Place,
London, S.W.1.

MINISTRY OF OVERSEAS DEVELOPMENT

APPOINTMENT

AGRICULTURAL CHEMICALS

Shell International Chemical Co. Ltd. has a number of vacancies for graduates in its Agricultural Chemical Division at Shell Centre, London. A good degree in agriculture or other biological sciences is required, although other science disciplines would be considered. A knowledge of foreign languages would be advantageous.

The work is concerned with technical/commercial aspects of marketing pesticides world-wide and could involve periods of travelling overseas.

Applications are invited from:

(*a*) Men, preferably not over 30 years of age, who have relevant post-graduate experience, particularly in tropical agriculture,

(*b*) Men who have recently graduated.

Apply in writing giving brief details of age, qualifications and experience to:

SHELL INTERNATIONAL CHEMICAL CO. LTD.
Recruitment Division D.G. (PNEL/1)
Shell Centre,
London S.E.1.

Bacteriological Techniques for Dairy Purposes

The bulletin contains a useful historical introduction, sections giving the technical details for preparing glassware and bacteriological media and standard methods for the examination of raw and pasteurized milk, milk rinses and swabs of dairy equipment and farm water supplies. The appendices contain recommendations for the application of bacteriological advisory work in relation to modern methods of milk production.
(*Technical Bulletin No. 17*) 13*s.* 6*d.* (by post 14*s.* 6*d.*)

Grass and Clover Crops for Seed

Describes the origin in Britain of the growing of, and trade in, grasses, clovers and some other legumes for seed and contains sections on the quality and differences in growth and development of herbage seeds, on their usefulness as an economic cash crop in arable rotation and on sowing, management and storage. Chapters deal with weeds in seed crops, weed control in the field and the requirements under the Seeds Act; and with the types, effects and control of diseases and pests which may attack crops and reduce yield.
(*Bulletin No. 204*) 7*s.* 9*d.* (by post 8*s.* 3*d.*)

A free list of agricultural and horticultural titles is available from Her Majesty's Stationery Office, (P6A), Atlantic House, Holborn Viaduct, London EC1

HMSO

Government publications can be obtained from the Government Bookshops in London (post orders to PO Box 569, SE1), Edinburgh, Cardiff, Belfast, Manchester, Birmingham and Bristol, or through any bookseller